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23-29 August 1984

WEEKLY

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Vol 3 No 34

Oric writ for Saatchi

ORIC Products International is now involved in a suit and counter-suit with its advertising agency, KMP, a wholly owned subsidiary of Saatchi and Saatchi.

KMP issued a writ against Oric for non-payment of £200,000 owed to the advertising agency. The money had been outstanding since April.

On the day before the case was due to be heard, Oric lodged a counter suit, claiming "wrongful advice" from KMP.

"Oric had been legally advised not to pay the debt, and so is putting through a counter suit," said an Oric spokesman.

"As far as we can tell, the object of the counter suit is to delay proceedings until Oric can get time to sort out a deal for payment," said Dick Richards, KMP's finance director.

"Oric has said that we didn't do what it was to pay us to do. But, according to instructions, approved advertising appears continued on page 5.

Commodore's net in autumn launch

COMPUNET, Commodore's own networking system for owners of its 64 micro is now operational.

At present only a panel of user-group members have access to the system, which will be launched to the public on September 19.

The first Commodore modems should be delivered from next week and purchasers will each receive a free Compunet subscription form.

"Judging from our mailing list of people who have ordered modems, we expect to have about 1,000 subscribers to Compunet by October," said Commodore's Mike Horne.

"We plan to produce a minimum of 20,000 modems by Christmas."

Teleshopping, an estate agency service, full database

and free software will all be available initially on Compunet. The joint organisers of the system, Commodore and ADP Network Services, are in negotiation with a high street bank for a home banking facility.

"One of Compunet's stronger features will be the educational software provided," continued Mike. "At the moment, we have fifty good quality educational packages on the system — these will be updated by ten more each month.

"Software vendors have been particularly interested in Compunet because of the security of the programs. The Commodore modem effectively becomes a dongle with Compunet — down-loaded software can only be used when the same modem is connected to the computer."



Stranglers quilled

FOUR-MAN rock group The Stranglers, who rose to prominence during the punk music explosion of 1976, are to release an adventure game with their new album *Aural Sculpture*.

The adventure will be included in the cassette version of the album, although not packaged with the record.

The game, *Aural Quest*, written for the 48K Spectrum using *The Quill* is based on the album's theme. Players must travel the world in search of pieces of the ear, which they must then fit together.



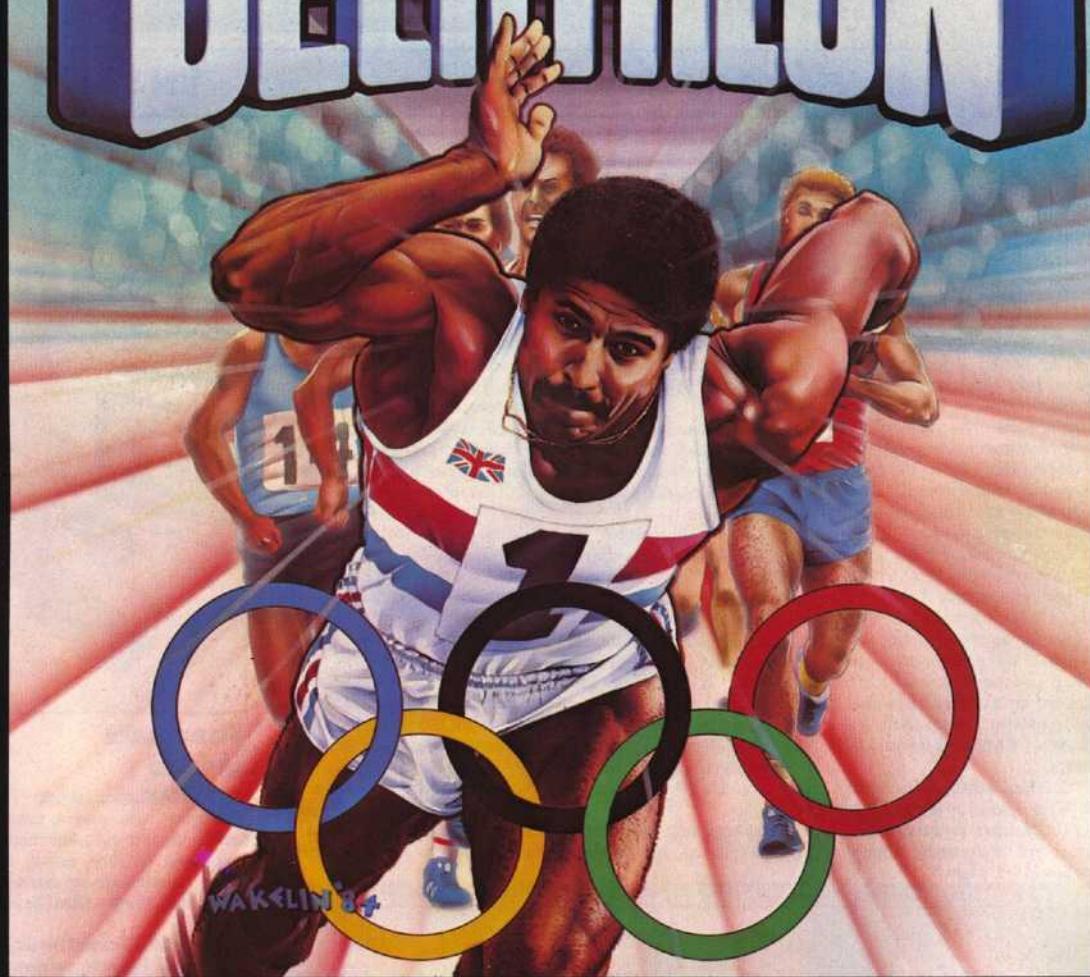
INSIDE

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>View

Sinclair has announced that it plans to set up its own chip manufacturing plant.

At present all the integrated circuit microprocessor and memory devices used in British micros are either made in the US or Japan.

Such a situation places our computer manufacturers at a significant disadvantage. It makes them vulnerable to changes in currency exchange rates and import duties with no control over the availability of the chips they use.

While Atari and Timex were being savagely beaten in the US market last year, Commodore sailed on to gain over 60 per cent of the market. One factor in Commodore's success is the fact that the company makes its own chips. In times of shortage Commodore will no doubt service its own needs before those of its competitors. Commodore also has a development advantage. It is able to work more closely than its rivals with its chip plant to develop the device it wants.

The key to future success in the computer market is higher and higher levels of integration — hence Sinclair's advanced wafer technology research group in Metalab. More and more semiconductor devices on a chip means smaller computers with fewer components which are cheaper to manufacture.

With chips like those Sinclair designed for the Microdrive and the flat-screen TV, both of which incorporate a very high degree of integration, Sinclair has proved its team can design innovative and competitive devices. Now Sinclair wants the facility to manufacture them itself.

And with the Japanese MSX manufacturers about to enter the home computer market as potentially the company's biggest rivals, it is very important that Sinclair gets a move on.

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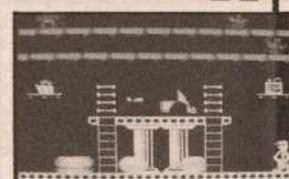
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ABC

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CTA Magazine of the Year 1984.

No.2

QUICKSILVA Computing SECTION

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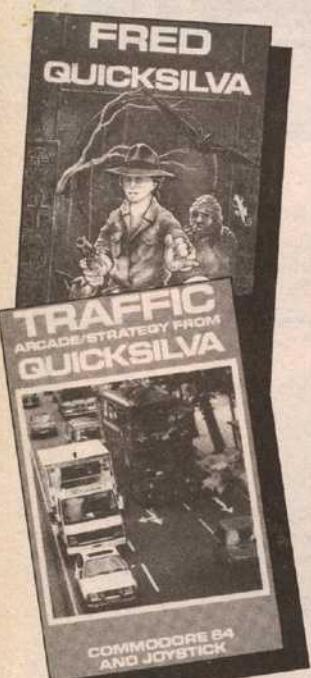
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10 Dragonsbane	48K Spec –	£6.95
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12 Aquaplane	CBM 64 –	£7.95
13 Gatecrasher*	BBC 'B' –	£6.95
14 Gatecrasher*	Electron –	£6.95
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17 Ultisynth	CBM 64 –	£14.95
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Chip plant for Sinclair

SINCLAIR Research looks set to move into manufacturing for the first time with plans to build a semiconductor factory in the UK.

The plant is part of Sinclair's fifth generation project, announced by Sir Clive Sinclair two weeks ago.

The chips produced using advanced wafer-scale integration techniques will, however, not be for sale on the open market. Instead they will be used by Sinclair Research in new products based on the results of research now being carried out at the company's Metalab in Cambridge. A team at Metalab has been set up to research new semiconductor

BBCs for Ireland

ACORN Computer Group is to set up a manufacturing facility for the BBC B micro in the Republic of Ireland.

The company has appointed Lendac Data Systems of Dublin, already sole distributors of the BBC in Ireland, to begin manufacture in September. Production of 5,000 units is expected in the first year of operation.

Oric writ

continued from page 1

red in approved media at an approved price."

The case should now be heard in September.

Oric has also denied that it may be pulling out of the UK market altogether, as has been suggested. "Oric is a UK company and we recognise that we need to maintain a healthy position here for the Atmos and future products," continued its spokesman.

However, 15 redundancies have been made at Oric in the UK, and 15 more staff taken on in Europe. The company has also been negotiating to set up a French manufacturing facility.

Fuller crash

FULLER, the Spectrum peripherals manufacturer, has gone into receivership.

Two weeks ago, the company was declared insolvent at a board meeting, and after the

wafer fabrication and thin-film techniques.

The company hopes that the factory will be completed by the time Sinclair's proposed share flotation takes place next year. One of the first devices planned to be built by the plant is the 0.5M Ram expansion for the QL.

• The company has also appointed a second distributor for the QL in addition to Prism — Terry Blood Distribution (Computers) — TBD — of Staffordshire, major distributors of records, tapes and videos.

Rabbit debts top £200,000

A STORMY meeting of Rabbit Software creditors on August 10, appointed certified accountant Stuart Andrew Edgar as liquidator.

Edgar was nominated by Rabbit shareholders, the creditors putting forward no alternative nomination.

The total debts of Rabbit, which went into liquidation three weeks ago, amount to over £220,000. While the company has assets of just over £284,000 its realisable value is put at £182,700. The assets are now in the care of Rosan & Co, of Croydon, Surrey, acting for the sheriff of London.

Sanyo MSX prices

SANYO has announced the price of its MSX micro, to be launched in this country in the Autumn.

The Sanyo MCP 100, at £299.95 will be £20 more expensive than its main MSX



creditors' meeting on Friday, August 24, will go into voluntary liquidation.

Along with Quicksilva, DKtronics and Kad, Fuller was one of the first companies to produce add-ons for the ZX81.

Ocean goes for Gold

MUCH of the new software available this autumn will be imported from the US.

After Sierra and First Star comes US Gold, the company set up jointly by Ocean and Centre Soft.

The company has now signed deals with nine US companies, including Datasoft, Cosmi, Micropose, Bally Midway, Synapse, Access and Strategic Simulations to produce games for the Commodore 64 and Spectrum.

Over thirty titles are involved in the first batch of releases including games like *Caverns of Kafka* and *Slinky* from Cosmi, and *Zaxxon* from Synapse, which have previously only been available here on Atari.

Games with themes familiar to a UK audience include Datasoft's *Dallas Quest* and *Bruce Lee* titles and *Buck Rogers* and *Star Trek* from Bally Midway.

Some of the Commodore titles have already arrived — Cosmi's *Forbidden Forest*, Micropose's *Solo Flight* and Access' *Beachhead* — and the remainder will be released within the next month or so.

"The Spectrum versions will be following a month behind," said Ocean's David Ward. "Because we are doing the manufacturing in this country rather

rival, Toshiba's HX10.

It has 64K Ram, 32K Rom and 16K video Ram. The MCP100 has a Centronics parallel printer port and at the time of its launch, MJY-01 joysticks at £12.95 and a light pen and cartridge adaptor — the MLP-01 — at £89.95, will also be available.

Houses shift out of Dragon

SOFTWARE houses which rose to prominence producing material for the Dragon are now — following Dragon's receivership — looking to other machines.

Software and Salamander have both announced Autumn releases, which are mainly conversions from the Dragon to other machines and neither has announced new Dragon titles.

Salamander, not in receiver-

than simply importing, we are able to sell at UK prices instead of the \$30 these games cost in the States."

David Ward
managing
director
of Ocean



Most of the Commodore titles will be £9.95 and most Spectrum programs will be £7.95. Versions for the Amstrad and MSX machines are also under consideration.

Ocean and Centresoft have between them invested £800,000 in US Gold. Ocean will be mainly responsible for the technical work for the conversions with Centre Soft handling distribution.

ship as has been widely rumoured, will be converting the *Dan Diamond* trilogy for the Spectrum and 64, at around £13.00 for the three programs and *737 Flight Simulator* for MSX and the Oric Atmos at £9.95. Its multi-part adventure *Castle Baron*, which the company began work on eighteen months ago, is now to be written on the Commodore 64 rather than the Dragon and is now expected to be released in early 1985.

However, the company is also setting up a Software Discount Club specifically for Dragon owners who are having difficulty in obtaining Dragon software.

Any future releases we do for the Dragon may well be limited to club members by mail order," said Chris Holland of Salamander.

Shards will be releasing *The Pettigrew Chronicles* for the Commodore 64 and the Spectrum, a 'compilation' program of the best parts of *Pettigrew's Diary* and *Operation Safras*, according to managing director Steve Maltz. *Empire*, the strategy game, is to be converted for the 64, and *Calilee*, the sequel to *Jericho Read*, is being released for the Spectrum.

Shards looks unlikely to release any new games for the Dragon.

• It has now been confirmed (see PCW July 19) that Eurohard SA, of Cáceres in the Extra Madura region of Spain, has bought the assets of Dragon Data. Manufacture of the Dragon 32 and 64 will begin in Spain as soon as possible. GEC will handle distribution here.



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69 Trashman	7.95	6.36	273 Fortress	7.95	6.36	272 Battle Tanks	7.95	6.36
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Letters

QDOS manual

Way back in January 1984, when the Sinclair QL was launched, there was much said about 'multi-tasking' and the amazing QL operating system — QDOS. Now, seven months after ordering the QL and two months after receiving the machine and its 'User Guide', I have taken delivery of the 'QDOS Manual' at a cost of £13, including postage and packing.

The document Sinclair Research calls the 'QDOS Manual' is, in fact, the missing pages from the QL Users' Guide detailing such mysteries as 'multi-tasking', system variables and QDOS system calls which the advanced programmer would find invaluable.

I ended up with my QDOS Manual by writing polite letters to Sinclair Research asking for the technical data "... I felt I had a right to be supplied with". This resulted in my getting a letter from the Customer Relations Department suggesting that I forward a cheque for £13. Try it — it might work for you. It arrived within a few days — honest!

Once you get your hands on one of the elusive documents, written by Tony Tebby, you will find it has some 150 pages and is written in a highly technical manner.

The first thing I noticed was a secret revealed which has been kept closely guarded by Sinclair: The QL was initially intended as a 32K/128K RAM configuration with an option to upgrade, similar to the Spectrum 16K/48K arrangement.

A brief introduction and overview of QDOS starts the manual, closely followed by details of changes to previous versions. My manual documents QDOS Version 1.03 — the earlier ones run through the release numbers 0.05, 0.06, 0.07, 0.08, 1.00, 10.01 and 1.02. In fact, you can find out which version of QDOS you have by looking through the Rom for a string in the format *n.nn*. My 'AH' version QL has version 1.02 QDOS.

The first half or so of the manual systematically describes each system call to QDOS (via the MC68008 Trap

instructions) detailing input parameters, output parameters, registers affected and possible error return situations. The subjects covered by these Traps are: job creation and deletion, job management, resident procedure control, display handling, Intel i8049 communication, serial port control, real-time clock control, memory allocation and file handling.

Other chapters are devoted to such subjects as device drivers, Rom drivers, interrupts, arithmetic handling, QL Microdrive format, interfacing to QL SuperBASIC, system variables and example assembly programs.

Details on QL Peripheral expansion are not available until "after the launch of the various devices".

As I said earlier, the manual is not exactly written with the complete beginner in mind — more the advanced programmer, or hobbyist.

With this said, I have to say the QDOS Manual is everything I wished. Let us not get romantic, though. It is quite obvious this extra information should have been supplied in the first place with the QL — not as an optional extra several months later. I hear that 'multi-tasking' is not implemented on QL versions FB, PM and AH. We will all have to wait for Sinclair to plug in the precious JM version, "within ten working days".

Then, your QDOS Manual will become a QL Bible.

Alan Turnbull
Gale Green
Stockport
Cheshire



A new bug

Ian Logan wants to hear about 'new' Spectrum bugs huh? OK, here's one.

1 DEF FN e(n,m)=n+m: DEF FN f()=FN e(29,FN e(17,8)): REM numbers chosen especially for HHGTTG fans.
PRINT FN f()

42

is the wrong answer. FN e(n,m) just calculates the sum of two numbers, FN f() should give the sum of 29 plus the sum of 17 and 8 (29+17+8=54), but it doesn't. In fact, the computer has worked out 17+17+8=42.

This is because, although the Spectrum uses a stack to keep track of the order of functions (ie, it must perform Fn e(17,8) before Fn e(29...) it holds the numbers it works with, its operands, in fixed locations. This means that the 29 and the 17 will occupy exactly the same areas of memory because they are both the first operand of an Fn e. Since the 17 is interpreted after the 29, it just replaces it before the computer has had a chance to do anything with the 29.

So the computer ends up evaluating Fn e (17,17+8).

Julian Skidmore
25 Cossall Road
Trowell
Notts

Evil and sinister

Firstly, congratulations on the improvements to *Popular Computing Weekly*. It was always the leading magazine, but is now even better (perhaps with the exception of the unamusing advertisement from Automata).

Anyway I digress from the main point, which is to point out my extreme displeasure at receiving inside PCW this week a leaflet advertising a Dianetics publication. You cannot fail to have read a High Court Judge's recent comments about the Scientologists — the group behind Dianetics — whose activities parallel those of the Unification 'Church' (Moonies).

The Judge described Scientology as "Evil" and "Sinister", and by allowing Scientology a place in your publication, you may have unwittingly lined up some reader or readers for a

particularly nasty experience.

H Petfield
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The magazine will not be taking any more Scientology ads.

Vic20 modulator

It was interesting to read Phil Roger's reply to P Whalley in *Peek & Poke* in the July 19 issue on the question of faulty Vic20 modulators.

A 'faulty' Vic modulator is often caused by users and not by the Black Box itself. Many people (quite possibly Mr Whalley not included) remove the modulator from the Vic by tugging at the cable between the modulator and the machine, and not by the recommended method of holding the actual connecting plug. Constant tugging wrenches the leads inside the connector out of position causing loss of sound, or picture, or both.

M J Davies
The Waverley
79 Rhosmaen Street
Llandeilo
Dyfed

Stop bickering!

I would just like to point out to Mr Bathurst (August 9 issue), that, while the Commodore 64 has only 39K for Basic programming, it has another 19K which can be used either for machine code, or for storing graphic or sound detail.

I also object to letters like that of Mr Haighley (same issue), which, while it has a point to make — that magazines do not print enough for the Electron (I agree, but can't the Electron use BBC software?), the writer also decides to slip in a quick slagging-off of the Commodore 64.

Well, I own a TZQPA 3200042K computer with built-in speech synthesiser, instant retrieval disc drive, TV-resolution graphics, and it's better than all the other computers put together, so stop bickering!

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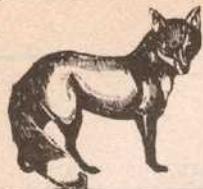
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Jaws

Just when you thought it was safe to go back to your computer . . . *Jaws* for BBC B by Robert Hadden

In this program for the BBC B you are a diver trying to retrieve golden treasure chests from the sea-bed and put them in your blue boat.

If you touch any of the harmless red fish, they become frightened and a shark is alerted which chases you until you are safely inside the boat.

As you progress, the shark moves faster and the red fish get closer together. Naturally, you swim more slowly when carrying the heavy chests.

Lines

30 - 90 Set up envelope, variables, user-defined characters at graphics cursor (VOUS)

110 - 120	Draw sea-floor and surface using background fill (plot 77)
150 - 170	Main loop moves diver, stopped by meeting non-background colour
210 - 260	Clear screen for shark. Chase until non-background colour. Repeat or die
ProcM	Draw diver at B%, A%
ProcS	Draw shark; move closer to diver
Proc I	Check for key-press; change diver's coordinates; draw diver
380 - 400	End game, high score, restart
ProcFISH	Clear screen window; draw flashing fish with random spacing
ProcPICK	Adjust screen and score when treasure picked up

ProcNEWP	Draw new treasure and fish
ProcSCORE	Adjust score with fanfare
ProcI	Set faster flash rate

Variables

B%, A%	Diver's co-ordinate
C%, D%	Shark's co-ordinate
I%	Score
F%, W%, X%	
Y%, 2%	Control loop variables
N%	Speed of shark
M%	Speed of diver
P%	Position of treasure
PC	Flag for treasure



```

10REM *** JAWS ***
20REM *** By R.D.M.Hadden 1984 ***
30MDE2:HS=5:N$=""
40PROCINTRO
50REM *** INITIALISE ***
60B%=450:A%=990:M%=20:T%=-10:PC=0:N%=26:H=40:VDUS
70ENVELOPE1,128,0,-2,2,25,25,25,0,0,-126,126,0:ENVELOPE2,10,4,-8,0,4,1,1,0,
0,0,-126,126,0
80GCOL0,134:GCOL0,9:CLG:COLOUR130:COLOUR4
90VDU23,250,0,1,59,126,59,1,0,23,251,16,57,127,255,63,125,56,0,23,252,24,
24,74,60,24,24,36,36,23,253,0,112,248,248,248,248,248,248
100REM*** DRAW ***
110GCOL0,2:MOVE0,90:DRAW1279,90:FORF%=90TO0STEP-4:PLOT77,S%,F%:NEXT:COLOUR130:
VDU4:PRINTTAB(0,30)"Score":TAB(0,31)"HS-";N$;" ";HS::VDUS
120GCOL0,4:MOVE300,980:PRINT"\_ /":FORF%=976TO952STEP-4:PLOT77,400,F%:NEXT
130GCOL3,6:PROC
140REM*** MAIN PROG ***
150REPEAT
160PROC1
170UNTILPOINT(B%+32,A%+16)
180IFPOINT(B%+32,A%+16)=5 PROCPICK:GOTO150
190IFPOINT(B%+32,A%+16)=2 PROCNEWP:GOTO150
200REM*** SHARK ***
210COLOUR134:VDU4,28,0,23,19,3:CLS:VDUS,26:COLOUR130:MOVEB%,A%:VDU252
220N%+2:C%=1250*(RND(2)-1):D%=200+RND(800):MOVEC%,D%:VDU251:SOUND2,2,20,-1
230REPEAT:PROC1:PROCS:UNTILPOINT(B%+32,A%+16):*FX21,6
240IFPOINT(B%+32,A%+16)<>2 GOTO380ELSEGCOL3,6:MOVEC%,D%:VDU251
250IFPC PROC FISH:GCOL3,6
260GOTO150
270REM ***DRAW MAN***
280DEFPROC M:MOVEB%,A%:VDU252:ENDPROC
290REM*** SHARK ***
300DEFPROC M:MOVEC%,D%:VDU251:C%=C%-N%*(B%>C%)+N%*(B%<C%):D%=D%-N%*(A%>D%)+N%*(A%<D%)+N%*(D%>950):MOVEC%,D%:VDU251:ENDPROC
310DEFPROC1:IFINKEY(-103) PROC M:B%=B%+M%*(B%>M%):PROC M
320IFINKEY(-104) PROC M:B%=B%-M%*(B%<1220):PROC M
330IFINKEY(-66) PROC M:A%=A%-M%*(A%<990):PROC M
340IFINKEY(-98) PROC M:A%=A%+M%*(A%>109+M%):PROC M
360ENDPROC
370REM *** END ***
380VDU4:PRINTTAB(0,25)"YOU HAVE BEEN EATEN.":*FX21,0
390IF T%>=HS PRINT "HIGH SCORE!":INPUT"Name ",N$:HS=T%
400IFGET$<>" " GOTO400ELSEGOTO60
410DEFPROC FISH:COLOUR134:VDU4,28,0,23,19,3:CLS:VDUS,26:COLOUR130
420FOR Y% = 500 TO 700 STEP 200: X% = 1300: Z% = Y%: REPEAT: FOR W% = 970 TO 1400 STEPS: GCOL0, W%: X% = X% - RND(H) - 45: Z% = Z% - 25 + RND(50): MOVE X%, Z%: VDU250: NEXT: UNTIL X% <= 0: NEXT: ENDPROC
430DEFPROC PICK:MOVEB%,A%:VDU252:MOVEP%,122:GCOL0,6:VDU253:GCOL3,6:PC=0:MOVEB%,
A%:VDU252:SC%=5:PROCSCORE:M%-=M%-10:ENDPROC
440DEFPROC NEWP:IFPC ENDPROC ELSE PC=1:H=INT(H*.8):SC%=10:PROCSCORE:IF H=20 PROC1
450PROC FISH:GCOL0,3:P%=RND(800)+200:MOVEP%,122:VDU253:M%=M%+10:GCOL3,6:ENDPROC
460DEFPROC SCORE:T% = T% + SC%:VDU4:PRINTTAB(5,30)T%:VDUS:SOUND1,1,100,20:ENDPROC
470DEFPROC1:*FX9,20
480*FX10,20
490ENDPROC
500DEFPROCINTRO
510COLOUR134:CL5:COLOUR1:PRINTTAB(8,5)"JAWS":TAB(2)"By R.Hadden 1984":COLOUR4
:PRINTTAB(0,15)"A - up""Z - down""< - left""> - right""space - start"
520PRINTTAB(0,25)"Carry treasure to boat and avoid fish which warn maneating shark when scared."
530IFGET ENDFROC

```

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Software secret agent

Graham Taylor talks to software programmers' agent, Jacqui Lyons

There was a time about a year ago when it seemed that the only teenage males not being signed to flamboyant Liverpool software houses were those too busy appearing on Top of the Pops.

For every one that made enough money to buy all the hi fi's, walkmen, compact discs, videos and bigger and better computers, he could ever require, there were countless others who received little or nothing and felt bitter and cheated.

It was a peculiar situation, a lack of managerial, organisational and, above all, legal experience on the part of everyone involved — particularly the programmers who, like so many teenybop stars before them, seldom understood what they were signing. Of course, this is the more generous explanation of what occurred, there is another: many of the people involved were crooks.

It really needed a professional person whose job it was to look after the programmers' interest.

One of the most successful of these software agents is Jacqui Lyons whose company Marjaq Scripts is jointly run with co-director George Markstein — best known for his work on *The Prisoner* and other TV programs.

"To begin with I had no idea about how to contact software programmers," said Jacqui. "I first tried a tentative ad in a

computer magazine — I got virtually no response from programmers at all, but I was inundated by publishers looking for computer book authors, so I knew it was an area worth pursuing.

"The small software houses where it's one man in his house selling games and paying royalties are and were, from last year, going out of business. The big companies are taking over and they need proper negotiated contracts, agreed time limits, specific programming requirements and the rest.

Equally the programmers find they are dealing with big international companies and they need support in getting the right deal."

Jacqui takes on people rather than products — a concept that some programmers have found surprising. "My work is not primarily concerned with introducing people to one another and organising contracts — I spend a lot of time getting the programs right. I tend to look after things like graphics and spelling which is usually quite appalling."

Programmers are often their own worst enemy. "They are sometimes very badly equipped for interaction with other humans — they are frequently very tongue-tied — you wouldn't believe the number of incomprehensible messages I get on my Ans-

phone. Half the time I can ring them back to find out what they want because they forget to leave their names and addresses."

Jacqui has built a team of programmers "about 25 — I wouldn't want to deal with more than" — who do work to order. "We've been involved with companies such as Century, Mozaic, Cheetah and Island Logic who have been especially set up for computer software, but the more conventional publishers are getting involved too. I'm often talking to the same people I used to talk to when I was dealing solely in books."

The computer/book package where a computer game, often an adventure, contains themes from a well known book is obviously an area particularly appropriate to Jacqui's set-up.

I point out that the initial offerings in the book/software area have been lame to say the least. "That's true and it really reflects the fact that although the book companies were quick to spot the trend — they'd seen what happened with computer books after all — they didn't know how to go about it. For example, one company insisted that all the programs be written in Basic so that they would be easy to transfer from one machine to another — obviously the end result was just far too unsophisticated."

Jacqui and her team have been working on the first major software release from Century Communications — the recently set up software side of Century Publishing. To be called *Legend*, the program is a text adventure with arcade sequences. "It's based around a book and Century commissioned us to develop the gameplay."

After book publishers the next people to move into computer publishing are the independent TV companies. Aside from Thames' expected deal with DK Tronics to produce software based on some of its better known programs, other companies such as Granada are known to be keen.

"At the moment I think some of the TV people are in very much the same position as the book publishing houses were until recently — that is they don't really know what they want and have little idea about computers and what make a good game."

As much as anything else, the development of a role as sophisticated as that of Jacqui's reflects how the industry has changed over the past year. The distinction between the programmers and the promoters and marketers of the product is growing wider — the last few one-man bands are quietly going out of business.

As Jacqui says "now it's thousands invested, months of development, marketing strategies and the rest; it involves teams of programmers, proper contracts, and strict schedules. It also means discovering who has the rights to what and whether those rights include electronic media rights; in short it's getting very complicated."



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Hardware Review

Liberated

Hardware Concept Keyboard Micro Apple, BBC B, RML 380Z/480Z, Pet, Vic20, Spectrum Price A3 size (reviewed here): £113.85; A4 size: £79.35. Interfaces leads: £20.70 (Apple, BBC, RML); £24.15 (Pet, Vic20); £28.75 (Spectrum) Supplier Star Microterminals, 22 Hyde Street, Winchester, Hants.

Imagine a ZX81-type keyboard sixteen inches by twelve! A nightmare? No, it's the long-awaited liberation from typewriter tyranny.

The traditional keyboard has so far dominated micros. Despite the coming of joysticks, instrument interfaces and mice, most of us bash away on Qwerty boards.

They are useful but two groups of people find them extremely hard to use: very young children and handicapped people with poor physical co-ordination.

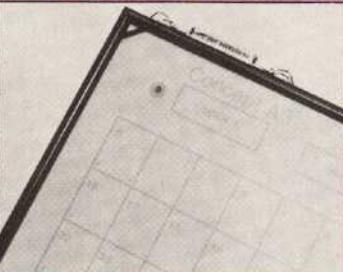
The Concept Keyboard is rather like a framed wall picture in size and dimensions — oblong about one inch high and solidly built. The top is a set of 128 touch-pad keys covered in a tough plastic skin plus some control keys.

This presents a flat surface on which you can place paper — known in the

jargon as an overlay. A few lines of Basic loaded in from the accompanying cassette tell your micro which key has been pressed. The manual shows easy ways to group blocks of keys and gives examples of creating look-up tables.

You can program the board to respond when drawings or symbols on the overlays are touched. Imagine various board games in which the computer knows where you plonk your playing-piece down. This is the joy and dilemma of the Concept Keyboard — it is only as good as your ideas for ways of using it. Enthusiastic teachers of infants and the handicapped will rapidly develop the simple examples supplied to prepare games and lessons that offer new interest to their classrooms.

Starset is a program to design the



overlays and it is supplied free with the A3-size boards in versions for the BBC B, RML 380Z/480Z and Spectrum machines. It helps you generate and adapt programs to read the keyboard. It is menu-driven, very simple to use and includes options for creating a new overlay, viewing a directory of layouts held on disc, editing a previous layout and converting a layout into the interface file.

When creating or amending an overlay, Starset draws a picture of the Concept Keyboard on screen. The arrow keys position a cursor on the key to be defined. The definition of the square can then be entered.

To enable a Basic program to be used with the Concept Keyboard, the layout must be converted into an interface file (it is not necessary to change the Basic program). An option exists to automatically convert the layout to the required format.

A number of educational programs are also supplied. These are aimed at infants and are designed to teach simple arithmetic, shape recognition, etc.

For primary teachers and the handicapped it will be a long-awaited blessing..

For ordinary users who are not word-processing, it offers an intriguing alternative to Qwerty arrangements.

Dave Watterson

Cheetah

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A fair copy

Program Dune Rider Micro BBC Price £7.95 Supplier Micro Power, Northwood House, North Street, Leeds LS7 2AA.

One of the fundamental laws of home micros is that three months after the Commodore and Spectrum get a game the BBC will get a version of it (usually with less features).

Such is the case with *Dune*

Rider which is a version of *Moon Buggy*.

True to the original you have to trundle over the planet surface blasting backwards, forwards and upwards at the usual attacking aliens and jump over various rocks and pits which block your path.

If you liked the original then this is a fair copy — the graphics are quite small but you can blast away quite happily.

Ian Waltham



A grade above

Program Block-Buster Price £5.95 Micro Spectrum Supplier Compusound, 32 Langley Close, Redditch, Worcs.

This program is a direct copy of the TV game of the same name and is well done. The hexagonal parts of the Block-Buster board are cleverly made up on the Spectrum's none-too-flexible display. Colour and sound are used to the full and the game works well; allowing either a two player game or a player v any game like this will be in the

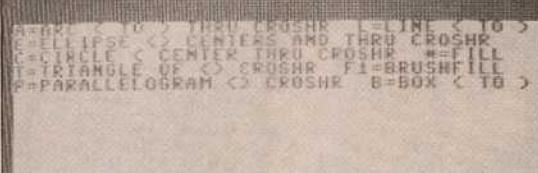
questions asked, and fortunately there is a good selection of questions at varying levels of difficulty. (But don't believe the blurb on the box: level 1 questions are the hardest, not the easiest!) What does put this game a grade above others is that it allows for new questions to be loaded in from tape, thus catching out those who have played before. I can see an industry in question tapes developing, too, once people work out the structure of the array they are in.

Of all the games around for the Spectrum, this one must be more educational than most, and is at a level to attract those

Curate's egg

Program Paint Pic Price £12.95 Micro Commodore 64 Supplier Kuma Computers Ltd, Unit 12, Horseshoe Park, Horseshoe Road, Pangbourne, Berks RG8 7JW.

This program is a multi-colour high resolution graphics utility from Kiwi-soft, a New Zealand software house, and it is very much like the proverbial curate's egg — good in parts.



The specification is excellent — it provides a complete set of commands for drawing, colouring and saving multi-colour hi-res pictures. For example, there are many predefined shapes available, commands to control the definition and use of complex textures, blocks of the picture can be manipulated, and there's a facility to help perspective dra-

wing. Additionally, there is a set of help screens if you forget any of the commands.

Unfortunately, this is where *Paint Pic* starts to be less impressive. The commands are pretty forgettable on the whole, only a few are at all useful. Furthermore, the help screens are very badly laid out; you have to scan through closely packed text to find the required information.

This would not be a problem if the manual was clear and concise. However, it isn't. It is written as a rather wordy tutorial, which is all right when you

first use the program but it subsequently becomes increasingly frustrating to use, because it is almost impossible to find anything quickly.

This is a great pity, because the facilities provided are very powerful, and an otherwise very good product is let down by poor presentation.

Richard Corfield



Word checker

Program Stylograph/Mail-Merge/Spell Check Micro Dragon 64 with disc drive Price £79.95 (OS9 disc is further £39.95) Supplier GEC/Dragon.

On the same *Stylograph* disc is another program, called *Mail Merge*. This will take a number of disc files and print them out as one document — one file can even finish in mid-sentence as long as the next continues from there. *Mail Merge* can also take a file of data and print multiple copies of a document inserting data where required.

Stylograph is the Dragon OS9 package of wordprocessor, addressing and spelling-checker. Once the OS9 disc is booted, *Stylograph* can be loaded.

The word-processor supports all the usual functions — full screen editing of text, side-scroll to accommodate long lines, full left and right-formatted text, automatic paging with definable headers and footers to each page, centering of text, automatic paragraphing and so on.

All of the formatting commands are entered as the first item on a line and are preceded by a comma, and all are dynamic, that is, their ef-

fect is immediately visible. Typing *Ctrl* — *F* (holding down *Clear* and pressing *F*) will show the text as it will be printed — hiding the formatting commands.

On the same *Stylograph* disc is another program, called *Mail Merge*. This will take a number of disc files and print them out as one document — one file can even finish in mid-sentence as long as the next continues from there. *Mail Merge* can also take a file of data and print multiple copies of a document inserting data where required.

The third program of this disc is *Spell Check*. This will check a text file prepared by *Stylograph* against a dictionary held on disc. Any words not found are displayed and you have the option of ignoring them, changing them, adding them or adding them to a supplementary dictionary.

Brian Cadge



computer game. The latter isn't easy, the computer often interrupting itself in the middle of a question to supply the answer. Unfair? No, because it's not very clever and as likely as not to get the answer wrong!

who, like most of us, find that they get wiped off the board when playing the computer at *Scrabble*.

Simon Springett



The strength or weakness of

Stranded

Program Crusoe Price £6.00
Micro Spectrum Supplier Automata UK, 27 Highland Road, Portsmouth, Hants.

Here is an adventure program that could be a big hit in the next few months. *Crusoe* puts you on a desert island armed only with your wits and some hints on the cassette box. The game never takes itself seriously, and the setting is a refreshing change from the ghoulsies and ghosties

what is going on are displayed, and you then decide what Crusoe will do. The vocabulary is large and the replies witty. The game seemed to work as it should, though entering "6" had dire results, and I was never sure why. Crusoe is intelligent: He won't, for example, try to walk on water and then drown, rather he informs you that he needs to get his swimming gear on. The *HELP* function is minimal, and I never did discover just how I got untangled from the cactus... but it was edible, which is more than can be said for all the fruit I found.



that most programmers' imaginations are limited to.

You are shown a map with Crusoe himself and various dangers and objects marked out, and as you get to the edge of the screen the map moves along to show the next section of the island. Reports about

Simon Sprigett



some underground caves which are protected by the inevitable monsters. The caves also contain the equally inevitable platforms, ladders and chutes. To marry the princess, Bongo must collect all the diamonds.

Whether the princess is very keen on having to marry a mouse (even if he is a super mouse) if Bongo ever succeeds in getting all the jewels is another matter. However, it may never come to that because the monsters are very effective in protecting the diamonds.

So, although not very original, the game is actually quite good fun, and is certainly quite challenging. But there are plenty of other games like this on the market, many of them better than this one.

Richard Corfield



Man or mouse?

Program Bongo Price £6.95
Micro Commodore 64 Supplier Anirog Software, 29 West Hill, Dartford, Kent.

A popular theme for arcade games is collecting objects from a cave or chamber that you make your way around by means of platforms and ladders, while avoiding some kind of monster in the cave. *Bongo* from Anirog Software uses exactly this theme.

The story behind the game is that the king (of nowhere in particular) has promised his daughter's hand in marriage to any man who recovers some stolen diamonds. Bongo, the super mouse, decides to have a crack at the challenge. The diamonds have been hidden in

some underground caves which are protected by the inevitable monsters. The caves also contain the equally inevitable platforms, ladders and chutes. To marry the princess, Bongo must collect all the diamonds.

Richard Corfield



Frustration

Program Gems of Stradus Micro Amstrad CPC 464 Price £7.95 **Supplier** Kuma Computers Unit 12, Horseshoe Park, Pangbourne, Berkshire.

Gems of Stradus follows the usual adventure format: overcome the hazards and find the treasure objects which you find lying around while in your travels.

This is a graphic adventure but since it is set in a maze all the pictures, which fill a quarter of the screen, look remarkably similar and are really only useful for spotting exits. The hazards, creatures and objects that you discover are all illustrated and are the best part of the graphics.

Moving is at first very confu-

sing because the cursor keys are used in a forward, back, left and right system — which results in rapid disorientation followed by frustration at getting lost so easily.

If you can master the movement, though, the adventure should be not insurmountably difficult to solve and therefore quite fun to play. If you do get stuck the *Help* facility gives clues that are as subtle as a brick!

More descriptive text would have improved the atmosphere and I would say that, unless you are really desperate for an adventure, I'd give this one a miss.

A maze is pretty boring compared to enchanted castles, sinister space ships and deserted mines.

Greg Pearson



Self-taught

Program The Complete Machine Code Tutor Price £9.95
Micro Commodore 64 **Supplier** New Generation Software Ltd, Bath, Avon.

Many home micro owners sooner or later become frustrated with the limitations of Basic, and turn to the possibilities of using machine code. However, the problem then arises of how to learn it.

One approach is to use a cassette based self-study course, and *The Complete Machine Code Tutor* from New Generation Software is one such course. It comes on two cassettes supplemented with a small manual.

The course is divided up into 24 lessons, each one descri-

bing a particular concept or group of instructions. Many lessons are followed by exercises containing some sample programs illustrating the content of the preceding lesson. The text is clear and concise, and the exercises are generally useful.

One very good feature is the 6502 simulator. This enables you to run the sample programs, or ones of your own, one instruction at a time, while displaying helpful comments and the contents of the registers and flags.

However, there is more to writing machine code than merely knowing what each instruction does, and this course does not go beyond the basics. As such it is a good introduction to machine code, but a good book would probably do just as well.

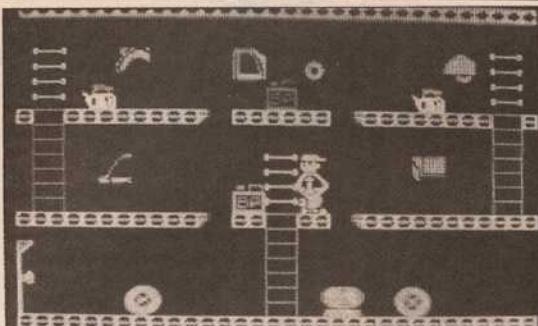
Richard Corfield



THE COMPLETE MACHINE CODE TUTOR

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Lesson 5 - Addition
Exercise 1 for lesson 5
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Exercise 1 for lesson 6
Lesson 7 - Increments and decrements
Exercise 1 for Lesson 7



Rolling tyres

Program Automania **Price** £5.95 **Micro Spectrum Supplier** Mikro-Gen, 1 Devonshire Cottages, London Road, Bracknell, Berks.

Arcade game fans roll up and buy this game: here are all the ingredients of a big success, with only a few small niggles to spoil the fun. The game took about five minutes to load from tape: a wasted five minutes in my case as it is incompatible with Interface 1 and the computer reset after loading. Switch off, unscrew Interface 1 and try again. This time, no problem.

Once the game is up and running, it rolls a selection of credits up the screen: study these carefully, some of the jokes are quite good. Sound is used well, and it's not their fault

that the Spectrum speaker is so feeble you can hardly hear it.

(They allow you to turn it off, but you may not notice any difference!)

Colour is exploited to the full and the graphics are excellent: faintly reminiscent of *Jet Pac*. I had no instructions with my tape, so it took a while to work out what to do but after studying the demo mode it became clear that the aim is to assemble a car in the Automania workshop, all the while avoiding falling tools, etc.

Should be a winner, and well worth the money if you are a games player. It should be made compatible with Interface 1, though, or microdrive owners may be put off by the inconvenience of removing what is designed to be a semi-permanent attachment.

Simon Springett



Mama mia

Program Oh Mummy **Micro Amstrad CPC 464 Price** £7.95 **Supplier** Amsoft, Brentwood House, 169 Kings Road, Brentwood, Essex.

In *Oh Mummy* you play the role of an eminent archaeologist — dressed in flat cap, overalls and boots — leading a team of four in a quest to recover five royal mummies and as much treasure as possible from some Egyptian pyramids.

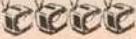
Everywhere you go — moving using either keyboard or joystick — you leave a trail of footprints. The passageways on the five levels of each pyramid are already clear and

all you have to do is excavate the 20 rooms on each floor by walking all round the room. Unfortunately there are two guardian mummies on each floor, one loose and one in an unknown room. These mummies chase you until you discover the key that allows you to move to the next floor. If you manage to dig up a magic scroll you can survive one mummy attack.

You can if you wish vary the speed and difficulty of play, as well as switch on or off the sound effects and background music.

In fact, this is not a bad arcade game, based loosely on *Amidar* with good cartoon-style graphics and sound.

Greg Pearson



Cold comfort

Program Pengo Micro **BBC Price** £7.75 **Supplier** Watford Electronics, 33-35 Cardiff Road, Watford, Herts.

Pengo is yet another version of that arcade game where you slide blocks of ice around whose title I can never remember. Ancient on the Spectrum and Commodore, it's even older on the BBC.

You are a penguin and the screen consists of you, square blocks of ice and a collection of blob monsters. Your only means of defeating the blob monsters is to slide the blocks

of ice towards them.

Pengo can only move a block of ice if it has a clear path, ie, doesn't have blocks next to it, so half the time your hapless bird has to 'melt' blocks to free a passage for them and thereby splatter the jelly things.

This is a good enough version of the game although on later screens all that happens is the number of monsters increase. Other features include a boundary which can send electric shocks and special cubes that do strange things as you put them in a line.

It's OK as a game but definitely too expensive.

Ian Waltham



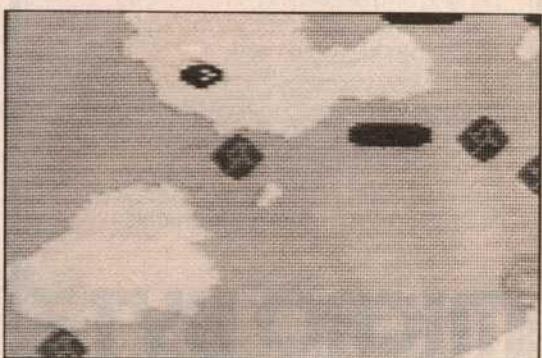
Performing ant

Program Turtle Jump **Price** £6.99 **Micro Commodore 64 Supplier** Romik Software, 272 Argyll Avenue, Slough, Berks.

Turtles have featured in a number of recent arcade games — *Turtle Jump*

You must get out of the treasure chest before the lid shuts or you will be trapped inside and lose one of your lives. You must also look out for the crocodiles, because when one appears all the turtles dive for cover, and if you are standing on one at the time you drown.

The game is well presented with nice graphics and title



from Romik Software is one of the latest. In this one you have to guide Ekim, a highly trained giant ant (oh really — whatever next), around a small group of islands by hitching a ride on the backs of passing turtles. The objective is to collect as much treasure from a chest full of gold as you can while the lid of the chest is open, and then return Ekim to his home on another of the islands.

screen and is really quite tricky. It is very difficult to land on the moving turtles and to stay on board as they float around. However, it soon becomes rather repetitive, and it is not really all that absorbing or exciting.

Richard Corfield



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Quantum mechanics

B Cornhill shows how to get QL program listings on a ZX printer using a Spectrum and Interface 1

If like me you have up-graded to a QL from a Spectrum with Interface 1 and ZX Printer then this program may be of interest.

Using the Serial 1 port on the QL and the RS232 port on the Spectrum, it is possible to get listings of your QL programs printed out on the ZX Printer.

Firstly you will need to wire up a nine-way plug that fits into the Interface 1 socket to the 'printer-end' of Sinclair's QL printer cable. You will first have to take off the existing RS232 plug by carefully unsoldering the six wires. Then resolder the printer lead wires to the nine-way plug according to the diagram.

After you have made up the lead, plug the one end into the *Ser1* socket on the QL and the other into the RS232 socket on the Spectrum Interface 1.

Then enter the following program into the Spectrum and *Run* it (I used baud

Wire from QL	Pin No on 9-way socket
Ground	Black
TXD IN	White
Rxd Out	Green
Dtr In	Blue
Cts Out	Red
	Orange

600 for no particular reason).

```
10 FORMAT"4;600
20 OPEN#4;""
25 LET A$=INKEY$#4
26 IF CODE A$=10 THEN LET
   A$=CHR$ 13:GOTO 30
27 IF CODE A$ < 32 THEN GOTO 25
```

30 LPRINT A\$;
40 GOTO 25

Now Load the listing you want to print out into the QL, and enter the following on the

QL as direct commands:

```
BAUD 600
OPEN#6, SER1
LIST#6
```

Lo and behold, the ZX printer will spring into life and produce your QL listing.

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Life, the universe and everything

A very sophisticated machine-code version of the classic game, Life by Richard Gain

Many versions of Life have been written since the rules of the game were first published in Scientific American in 1970. However, most of them suffer from one serious limitation; the playing area is far too small for all but the simplest patterns. The Horizons tape supplied free with every Spectrum includes a fast and colourful version, but with a grid of only 32 by 22 cells.

With the recent publication of *Wheels, Life and Other Mathematical Amusements* by Martin Gardner, a catalogue of new and old life-forms has become available for experimentation and all that is required now is a fast version of Life with as large a playing area as possible, hence the program below.

In case anyone has not come across the rules before, they are explained simply as follows:

- 1) Each cell on the grid has eight surrounding squares which determine the birth, survival or death of the cell in the next generation.
- 2) Any live cell with two or three live neighbours will survive to the next generation, otherwise it will die of isolation or overcrowding.
- 3) Any empty cell with exactly three live neighbours will become occupied in the next generation, ie, a birth.

This version runs on a grid of 160 x 160 cells each represented by one pixel. First type in the main program shown in Listing 1, then save onto tape with Save "Life" LINE 100. After verifying leave the tape in position and New. Now type in the Basic program in Listing 2 and Run it.

In response to the address prompts, enter the decimal bytes as shown until the program stops with the OK report. Next save the code on tape immediately following the Basic program, by typing Save "Code" CODE 23296, 230. Now rewind the tape and type "Load". Playing the tape should now result in the loading of both parts of the program and the screen will then show a pattern on a white square which changes about once every second. Now just watch as some beautiful Life patterns emerge.

The Basic program consists of two main parts. Line 100 onwards is the initialisation routine and includes the pattern drawer beginning at Line 200. Any combination of Plot and Draw statements may be placed at Line 200, but these should always end with Line 500 Goto 20. This is the start of the main program loop.

Line 20 moves a copy of the screen pattern up to an area in high memory, simultaneously reordering the screen lines by using a version of the Copy routine in ROM. Line 40 is then repeatedly called to

calculate and redraw the subsequent generations. Do not use Bread to stop the program as this may have unpredictable effects. Instead, simply press any key which will cause a Stop in Line 40. The pattern may now be altered or added to with Plot and Draw, and then restarted with Goto 20.

Because of the large amount of memory taken up by the machine-code whilst running, there is a limit on the number of lines which may be added after Line 200. (The system variable E-Line should not be allowed to go above 24576). More complicated patterns may be designed and saved with a

drawing program like Melbourne Draw. Line 200 should then be simply Load "SCREEN\$".

NB. The machine code resides in the printer buffer and any attempt to use the printer will erase it.

The assembly listing was produced on Gens 3 from Hisoft's Devpac and includes calculated expressions. This is to allow any square array of side 8 to 160 (multiples of 8 only) to be set up by simply altering the value in line 180 before assembly. Smaller arrays give faster generation times, up to 5 or 6 per second for 64 x 64 cells.

Listing 1

```

10 GO TO 110
20 RANDOMIZE USR 23325
30 PRINT AT 0,20; INVERSE 1; GE
N: LET GEN=GEN+1
40 RANDOMIZE USR 23330: IF INK
EY$()"" THEN STOP
50 GO TO 30
100 LOAD "CODE"
110 LET GEN=1
120 BORDER 6: CLS : PRINT "
130 GOSUB 1000
140 PLOT 48,0: DRAW 159,159
150 PLOT 48,159: DRHU 159,-159
160 PLOT -48,0: DRAW -159,159
170 PLOT -48,159: DRHU -159,-159
180 GO TO 20

```

Listing 2

```

100>FOR n=23296 TO 23296+230
110 INPUT (n),a
120 PRINT n,a
130 POKE n,a
140 NEXT n

```

23296	0	0	0	128	0
23301	0	0	0	0	0
23306	0	0	0	0	0
23311	0	0	0	26	0
23316	0	0	0	0	0
23321	0	0	0	0	0
23326	174	130	201	0	205
23331	33	255	95	54	243
23336	17	95	95	1	132
23341	102	237	176	33	162
23346	96	17	5	0	6
23351	160	197	35	60	7
23356	197	5	5	26	0
23361	46	27	63	0	19
23366	17	152	0	0	36
23371	43	0	0	37	0
23376	35	0	0	0	0
23381	43	0	0	4	0
23386	43	0	0	0	0
23391	15	200	3	95	15
23396	215	35	0	235	10
23401	0	0	0	235	15
23406	201	0	0	202	17
23411	160	0	0	160	19
23416	19	6	20	197	88
23421	35	91	175	6	5
23426	79	25	111	121	162
23431	7	19	16	247	225
23436	119	35	193	16	234
23441	193	1	1	6	16
23446	193	5	25	225	16
23451	193	5	51	231	17
23456	200	5	51	193	10
23461	64	229	197	0	38
23466	64	237	176	193	38
23471	36	124	230	7	30
23476	10	125	198	32	111
23481	63	159	230	248	130
23486	163	16	228	261	17
23491	6	64	0	192	33
23496	0	200	0	192	1
23501	53	0	0	176	93
23506	225	35	184	0	32
23511	32	16	160	108	32
23516	111	193	160	204	46
23521	133	193	16	209	61
23526	0	0	0	0	0
23531	0	0	0	0	0
23536	0	0	0	0	0
23541	0	0	0	0	0

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Pass 1 errors: 00

			5877	790	LLINE	PUSH BC
			5878	800	INC DE..	
			5879	810	LD B,WIDE	
			587B	820	PUSH BC ..	
			587C	830	PUSH HL ..	
			587D	840	LD H,91 ..	
			587F	850	XOR A,B ..	
			5880	860	LD B,B ..	
			5882	870	BBIT	
			5883	880	LD C,A ..	
			5884	890	LD A,(DE)	
			5885	900	LD L,A ..	
			5886	910	LD A,C ..	
			5887	920	OR (HL)	
			5888	930	RLCA ..	
			5889	940	INC DE ..	
			588A	950	DJNZ BBIT	
			588C	960	POP HL ..	
			588D	970	LD (HL),A ..	
			588E	980	INC HL ..	
			588F	990	POP BC ..	
			5891	1000	DJNZ BBYTE	
			5892	1010	INC DE ..	
			5893	1020	LD BC,32-WIDE ..	
			5895	1030	ADD HL,BC ..	
			5896	1040	POP BC ..	
			5897	1050	DJNZ LLINE ..	
			5898	1060	CALL SWDOWN ..	
			5899	1070	EI ..	
			589D	1080	RET ..	
00A2	200	SIZE	EQU	SIDE+2		
5884	210	GRID	EQU	SIZE*SIZE	589E	1090 SWUP
0014	220	WIDE	EQU	SIDE/8	58A1	1100 LD DE,51200 ..
	230				58A3	1110 LD B,192 ..
	240		DI		58A5	1120 LD HL,15384 ..
	250		LD	HL,24575	58A7	1130 PUSH HL ..
	260		LD	(HL),0	58A8	1140 PUSH BC ..
	270		LD	DE,24576	58A9	1150 LD BC,32 ..
	280		LD	BC,GRID	58AA	1160 LDIR ..
	290		LDIR		58AB	1170 POP BC ..
	300		LD	HL,24576+S	58AF	1180 POP HL ..
	310		LD	DE,54288-C	58B0	1190 INC H ..
					58B1	1200 LD A,H ..
					58B3	1210 AND 7 ..
					58B5	1220 JR NZ,JUMP ..
					58B6	1230 LD A,L ..
	330	LINE	LD	B,SIDE	58B8	1240 ADD A,32 ..
			PUSH	BC ..	58B9	1250 LD L,A ..
	340		INC	HL ..	58BA	1260 CCF ..
	350		LD	B,WIDE ..	58BB	1270 SBC A,A ..
	360	BYTE	PUSH	BC ..	58BD	1280 AND 248 ..
	370		LD	B,S ..	58BE	1290 ADD A,H ..
	380		LD	A,(DE)	58BF	1300 LD H,A ..
	390	BIT	RLCA		58C1	1310 DJNZ LOOP ..
	400		JR	NC,EMPTY		RET ..
	410		CCF			
	420		PUSH	HL		
	430		PUSH	DE	58C2	1330 SWDOWN
	440		LD	DE,SIZE	58C5	1340 LD DE,16384 ..
	450		SET	4,(HL)	58C7	1350 LD B,192 ..
	460		DEC	HL	58CA	1360 LLOOP
	470		INC	(HL)	58CB	1370 PUSH HL ..
	480		SBC	HL,DE	58CC	1380 PUSH BC ..
	490		INC	(HL)	58CF	1390 LDIR ..
	500		INC	HL	58D1	1400 POP BC ..
	510		INC	(HL)	58D2	1410 POP HL ..
	520		INC	HL	58D3	1420 INC H ..
	530		INC	(HL)	58D4	1430 LD A,H ..
	540		ADD	HL,DE	58D5	1440 AND 7 ..
	550		INC	(HL)	58D7	1450 JR NZ,JJUMP ..
	560		ADD	HL,DE	58D9	1460 LD A,L ..
	570		INC	(HL)	58DA	1470 ADD A,32 ..
	580		DEC	HL ..	58DC	1480 LD L,A ..
	590		INC	(HL)	58DD	1490 CCF ..
	600		DEC	HL ..	58DF	1500 SBC A,A ..
	610		INC	(HL)	58E1	1510 AND 248 ..
	620		POP	DE	58E2	1520 ADD A,H ..
	630		POP	HL	58E3	1540 LD H,A ..
	640	EMPTY	INC	HL ..	58E5	1550 DJNZ LLOOP ..
			DJNZ	BIT		RET ..
						Pass 2 errors: 00
	650		INC	DE	58E6	BBIT
	660		DJNZ	BYTE	58E2	BBYTE
	670		INC	HL	58E4	BYTE
	680		EX	DE,HL	58E5	CENT
	690		LD	BC,32-WIDE	58E6	EMPTY
	700		ADD	HL,BC	58E7	00A2
	710		EX	DE,HL	58E8	00A2
	720		POP	BC	58E9	00A2
	730		DJNZ	LINE	58E0	00A2
	740				58E1	00A2
	750				58E2	00A2
	760		LD	HL,54288-C	58E3	00A2
	770		LD	DE,24576+S	58E4	00A2
	780		LD	B,SIDE	58E5	00A2

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One key wonder

A program to allow the use of single-key entry, making it easier to type in a program

This program was written on a Dragon 32 and enables the user to use single-key entry like the Spectrum and ZX81. Using this method, it is possible to type in a Basic program quicker.

Every time a key is pressed a jump will be made to the program. The program then checks if the shift key is pressed at the same

time as a key A-Z. If so, the appropriate keyword is printed and this keyword is also loaded into the keyboard buffer. The program has one disadvantage and this is that when *Editing* Basic program lines the keywords have to be typed in normally.

Type in the program *Run* and save a copy of it before it is Run. Then *Run* the program

and after a few seconds the message *Which Key* will appear on the screen. Enter a letter from A to Z and then type in the keyword you want for that key. When all of the letter keys have been defined, type * in response to *Which Key*. The message *New The Basic Program* will appear on the screen and you should then type *New* followed by *C\$AVEM"SINGLEKEY", 32400, 32650, 32400*.

To use the defined keywords in future, type *Clear 100, 32399* and load in the machine code. You will then need to type *Exec* and the single key entry will be ready for use.

The list of possible keywords is shown in Listing 2.

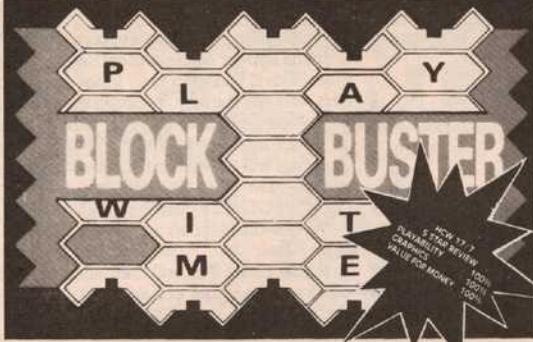
Listing 1

```
SINGLE KEY ENTRY
10 CLEAR900,32399
20 DIM A$(150),A(150):FORA=1 TO 150:A$(A)=""
30 DATA 134,126,185,1,106,142,126,156,191,1,107,57,52,34,129,65
40 DATA 37,6,129,90,34,2,32,3,53,34,57,183,126,249,182,255
50 DATA 0,132,64,129,0,38,241,247,126,250,16,158,136,49,63,16
60 DATA 159,136,48,31,52,16,182,126,249,72,183,126,249,246,126,249
70 DATA 142,126,121,50,16,174,132,53,16,166,160,129,127,34,14,187
80 DATA 128,124,126,250,52,48,189,181,74,53,48,32,236,128,126,189
90 DATA 181,74,187,128,246,126,250,52,175,0,0
100 FOR A=32400 TO 32506
110 READ B
120 POKE A,B
130 NEXT A
140 Z=0
150 X=1
160 FDRA=32819 TO 33089
170 Y=PEEK(A):IFY>127 THEN FL=A-Z:GOTO360
180 Z=Z+1:MD$(A$(X),Z,1)=CHR$(Y)
190 NEXT
200 FDRA=33226 TO 33359
210 Y=PEEK(A):IFY>127 THEN FL=A-Z:GOTO380
220 Z=Z+1:MD$(A$(X),Z,1)=CHR$(Y)
230 NEXT
240 '
250 '
260 '
270 CLS:INPUT"WHICH KEY ";K$:K=ASC(K$)
280 IF K$=""THEN EXEC 32400:PRINT"NEW THE BASIC PROGRAM":STOP
290 IF K$>65 OR K>90 THEN SOUND1,1:GOTO270
300 K=K*2:K=32377+K
310 INPUT"WHICH KEYWORD ";L$:M=LEN(L$)
320 FOR L=1 TO 101
330 IF MID$(A$(L),1,M)=L$ THEN 350
340 NEXT:PRINT"NO SUCH KEYWORD":GOTO 270
350 Y=A(L):GOSUB 390:GOTO270
360 '
370 MID$(A$(X),Z+1,1)=CHR$(Y-128):A(X)=FL:X=X+1:Z=0:GOTO190
380 MID$(A$(X),Z+1,1)=CHR$(Y-128):A(X)=FL:X=X+1:Z=0:GOTO230
390 '
400 W#=HEX$(Y):IFLEN(W#)=3 THEN W#="0"+W#
410 H=VAL("5H"+LEFT$(W#,2))
420 I=VAL("5H"+RIGHT$(W#,2))
430 POKE K,H:POKE K+1,I
440 RETURN
```

Listing 2 LIST OF KEYWORDS

FOR	GO	REM	ELSE
IF	DATA	PRINT	INPUT
END	NEXT	DIM	READ
RUN	RESTORE	RETURN	STOP
CONT	LIST	CLEAR	NEW
CLOAD	CSAVE	OPEN	CLOSE
SET	RESET	CLS	MOTOR
AUDIO	EXEC	SKIP	SOUND
TRON	TROFF	LINE	EDIT
PRESET	SCREEN	PCLEAR	PSET
PAINT	GET	PUT	CIRCLE
FMODE	PLAY	LOAD	PCOPY
TO	SUB	FN	TAB
SGN	INT	ABS	RND
SQR	LOG	EXP	COS
TAN	ATN	PEEK	LEN
VAL	ASC	CIR%	EOF
FIX	HEX\$	LEFT\$	RIGHT\$
POINT	INKEY\$	MEM	VARPTR

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Alison McCallum-Varey's book introduces you to all the four packages, but, most importantly, shows you exactly how to run them as a complete system. This book, essential for every QL Owner, will expand the day-to-day use of your QL, letting you run Quill and Archive in tandem for instance, and then outputting the results for graphic interpretation by the Easel package.

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Commodore à la carte

A machine-code routine giving a neat on-screen menu facility from Adrian Warman

The program gives the Commodore 64 a powerful menu selection program which can be incorporated into any program where at some point it is required for the user to choose from a number of different options.

The program will be printed over two weeks and this first installment will be continued next week.

Often screen menus show the different options each with a code number — eg, 1, 2, 3 — and you select which option you want by keying in the relevant code.

Rather than that, the program listed below displays a 'selection cursor' highlighting one item on the menu. The cursor can be moved around the items in the menu until the desired option is highlighted with the cursor. A single key-press will then return control back to the main program in which this utility has been incorporated — together with information of which item has been selected.

Three listings are included — an assembly-language version, a Basic Loader version for those without an assembler and a short demonstration program showing the menu facility in use. This week we print the first half of the program notes and assembly language listing. The Basic Loader and demonstration program will be printed next week.

Program Operation

To start the program, either type in the assembly-language listing or load and run the Basic Loader program. This will place the machine code program into the area of memory from \$C000 to \$C111.

However, the menu routine will not be

initialised until the command SYS 49152 is performed. This will modify the *Usr* vector so that the *Usr()* function can be used to perform the menu selection.

Once the routine is initialised, its operation can be invoked by using a command of the form:

item=Usr (dummy), retain, wrap, skip, xstart, xend, ystart, yend

For details of each of the parameters, see the Program Description section below. The easiest way to see how it works is to look at the similar format command at Line 180 of the demonstration program.

Once the menu selection process is started, the selection cursor can be moved through the menu using the *F1* and *F7* function keys. To select the currently highlighted item, press the *Return* key. This will exit the routine. The value returned from *Usr* is the item number of the highlighted menu item. Note that the top element in the menu is always referred to as item number 1, and the second element is always item 2, and so on, regardless of the number of blank lines between each menu item. All keys apart from *F1*, *F7* and *Return* are ignored.

Program Description

As described above, the command to invoke the Menu Selection process is:

Item=Usr(dummy),retain,wrap,skip,xstart, xend,ystart,yend

All the parameters above are values which are used to select the tasks performed in operating the menu selection routine.

Item. When the selection process has finished, the chosen menu item number

will be returned, and can be placed into item.

Dummy. This is any number or numeric variable. It will not be used by the routine.

Retain. Once the selection has been made, the programmer may wish to keep the highlight, or else remove it. If *retain* is 0, the highlight will be removed when the selection is made. If *retain* is 1, the highlight will remain after selection is made. Any other value of *retain* is illegal, and will produce an error message.

Wrap. As the selection cursor is moved up and down the menu (see below), the cursor will reach either the top or bottom of the list. If *wrap* is 1, then the cursor will wrap-around; in other words, when the cursor reaches the top, any further attempt to move the cursor up-wards will result in the cursor moving to the bottom, and vice-versa. If *wrap* is 0, then the cursor cannot wrap-around. Any other value for 'wrap' is illegal, and will produce an error message.

Skip. A spacing may be required between each menu item, in order to make the menu easier to read. *Skip* is used to indicate how many lines to move by, when transversing the menu. A value of 0 for *skip* is illegal, as is any value greater than 5. This upper limit could be changed if desired.

Xstart. The menu is assumed to be a column of items, starting at the column with the number given as *xstart*. The leftmost column has value 0, and the rightmost has value 39. Any value outside this range is illegal.

Xend. This value gives the column number of the end of the highlight area. Again, this is in the range of 0 to 39 inclusive, but the value must be greater than *xstart*.

The highlight effect is visible by the characters being reversed. However, if no characters are present, then no highlight

```
00001 0000      *= $C000
00002 c000      ;
00003 c000      ;menu selection program.
00004 c000      ;
00005 c000      ;by a.warman.
00006 c000      ;
00007 c000      ;
00008 c000      ;
00009 c000      ;
00010 c000      ;
00011 c000      ;
00012 c000      ;
00013 c000      ;
00014 c000      ;
00015 c000      ;
00016 c000      ;
00017 c000      ;
00018 c000      ;
00019 c000      ;
00020 c000      ;
00021 c000      ;
00022 c000      ;
00023 c000      ;
00024 c000      ;
00025 c000      ;define rom routines and system locations.
                ;
                ;hibase=$0288
                ;tstcom=$aefd
                ;getbyt=$b79e
                ;error=$a437
                ;getin=$ffe4
                ;usr=$0311
                ;
                ;define storage locations.
                ;
                ;retain=$008b
                ;wrap=$008c
                ;skip=$008d
                ;row=$008e
                ;xstart=$00fb
                ;xend=$00fc
                ;ystart=$00fd
```

can appear. The effect is best demonstrated by trying the example Basic demonstration program.

For the column numbers, if *xstart* is, say, 10, and *xend* is, say 15, then if the cursor is on a valid menu item row, and some characters are present in columns 10 to 15 inclusive, then they will be highlighted.

Ystart. This is the row number on the screen of the top-most item of the menu. The value must be in the range 0 to 24.

Yend. This is the lower row of the menu. Again, it must be in the range 0 to 24 but *yend* must be greater than *ystart*.

It is very important that there is a correspondence between the *y* values and the *skip* value. Consider the following example:

item = *Usr* (0),1,1,2,10,20,1,9

which sets up the following effects. When the item is selected, the highlight will remain. As the cursor is moved around, it can wraparound. Finally, there is one blank line between each menu item. The highlight can only appear in columns 10 to

20 inclusive. There should be menu items on rows 1,3,5,7, and 9; since these are the only rows that can be highlighted. Note that there is a 'skip' value of two, which is one blank line between each highlighted line.

How the Program works

Please refer to the Assembly-code listing while following the description.

10-15. The various Rom routines and system variable locations used by the program.

19-31. The storage locations for use by the program. In order to make the routine as fast as possible all addresses are in 'zero-page'. Since there are insufficient locations assigned to the user, some of the random number seed locations have been used as well.

36-40. This is the code which alters the *User* vector to perform the menu selection program.

44. Any parameter value which is out of range must cause an error message. This is a jump to the error routine, placed here so that branches can be made from within the program.

48-50. Calculates the value for *retain*. The *A* register is loaded with the smallest value which

is greater than the maximum for this parameter. Since *retain* can only have the values 0 and 1, the next largest number is 2. Hence *A* is loaded with 2. A sub-routine call is made to *getval*, which will get the next value in the command. If this value is illegal (by comparison with the *A* register), then an error will be produced. Otherwise, the value found will be returned in the *X* register, and with the *A* value unchanged. The value in *X* is kept as the *retain* command.

51-52. Finds the value for *wrap*.

53-57. Finds the value for *skip*. The maximum value is 5, hence *A* is loaded with the value 6. On return, a check is made to see if the value is 0 (which is illegal), and if so, an error is produced.

58-61. Finds the value for *xstart*. This cannot exceed 39. The value found is also placed into *posn*, which is used to calculate the position in memory of the menu.

62-69. Finds the value of *xend*. This has *xstart* subtracted from it to check that *xend* is larger than *xstart*, and also to find the width of the menu.

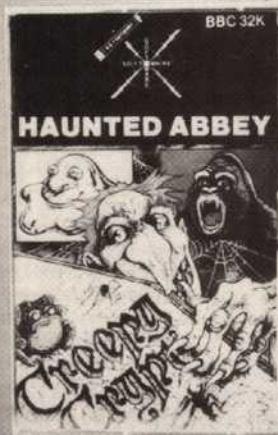
The continuation of the assembly language listing and the Basic Loader and demonstration programs will be printed in the concluding installment of this short series next week.

```

00026 c000      yend=$00fe
00027 c000      from=$0014
00028 c000      posn=$033c
00029 c000      width=$033e
00030 c000      temp=$033f
00031 c000      key=temp
00032 c000      ;
00033 c000      ;
00034 c000      ;initialise program.
00035 c000      ;
00036 c000      a9 0e      init lda #<start
00037 c002      8d 11 03    sta usr
00038 c005      a9 c0      lda #>start
00039 c007      8d 12 03    sta usr+1
00040 c00a      60          rts
00041 c00b      ;
00042 c00b      ;error jump.
00043 c00b      ;
00044 c00b      4c ee c0    badnum jmp badval
00045 c00e      ;
00046 c00e      ;program area.
00047 c00e      ;
00048 c00e      a9 02      start lda ##02      ;find parameters.
00049 c010      20 f3 c0    jsr getval      ;retain highlight?
00050 c013      86 8b      stx retain
00051 c015      20 f3 c0    jsr getval      ;wrap around ends?
00052 c018      86 8c      stx wrap
00053 c01a      a9 06      lda ##06
00054 c01c      20 f3 c0    jsr getval      ;what is skip?
00055 c01f      86 8d      stx skip
00056 c021      e0 00      cpx ##00
00057 c023      f0 e6      beq badnum      ;is skip ok?
00058 c025      a9 28      lda ##28
00059 c027      20 f3 c0    jsr getval      ;what is xstart?
00060 c02a      86 fb      stx xstart
00061 c02c      8e 3c 03    stx posn      ;prepare part of calculation.
00062 c02f      20 f3 c0    jsr getval      ;what is xend?
00063 c032      86 fc      stx xend
00064 c034      8a          txa
00065 c035      38          sec
00066 c036      e5 fb      sbc xstart
00067 c038      8d 3e 03    sta width      ;calculate width of menu column.
00068 c03b      f0 ce      beq badnum
00069 c03d      30 cc      bmi badnum

```

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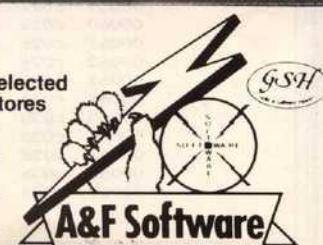
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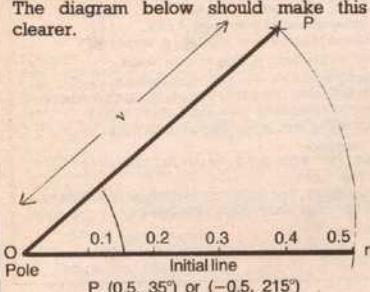


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Playing it cool

Robert Crook fixes a point using polar co-ordinates

The position of a point in a plane is often determined by Cartesian positioning, giving its co-ordinates (x, y) relative to two fixed axes (the x axis and the y axis). It is sometimes useful to fix the position of a point by polar co-ordinates where a fixed line is chosen as the initial line and we fix a point by saying that its co-ordinates are (r, θ) . Here r represents the distance between the fixed pole of the line and the point P on the line. The angle, θ , represents the angle between the line extending from the pole to the point P , and the initial line. The diagram below should make this clearer.



The task of plotting polar co-ordinates is often very time-consuming and small mistakes can often creep in and ruin results. This program, written for the BBC Model B, allows you to input any equation and then goes on to show the polar graph. You do not need to be a mathematician to appreciate some of the colourful patterns produced.

To use the program you must enter your equation using the letter A to represent Angle. You must also enter the angle increments (the smaller the more accurate) and the range of degrees you wish to examine.

An example calculation

Plot the polar graph of $r^2 = 5^2 \cos(2A)$. If any mistakes are going to be made it will be at this stage. Although the equation seems to be complete and ready for input, it will not at present give the expected results. In nearly all cases you will use A to represent degrees not radians and so to get the correct graph you must enter the word Rad in the equation.
ie. $r^2 = 5^2 \cos(\text{RAD}(2A))$

Of course, if you intend A to represent radians then the word Rad should be omitted.

The equation must be entered in the form $r...$ so the correct equation will be:

$=\text{SQR}(5^2 \cos(\text{RAD}(2A)))$

Here is what you would enter:

Equation $r = \text{SQR}(5^2 \cos(\text{RAD}(2A)))$

Increments Any number which will give suitable results.

Roots Y (We have used a SQR)

Root=(1/?) 2 (We used SQRSQR($r=r^{1/2}$)

In the last equation you will see that I have put $3/2$ in the root column. The program asks for the root to be entered as a fraction, so if the root was $(1/(1.5))$ — as it was in this case — then it must be entered as $3/2$. The fraction must be in its lowest terms. Because

Some example equations to try

Equation (r=..)	Increments	Roots	End angle	Description
$5^2 \cos(\text{RAD}(2A))$	2	None	360	Circle
$\text{SQR}(5^2 \cos(\text{RAD}(2A)))$	5	2	360	∞
$5^2 \cos(\text{RAD}(2A))$	2	None	360	Limacon without loop
$100^2 \cos(\text{RAD}(2A))$	2	None	360	Archimedean spiral
$\text{SQR}(5^2 \cos(\text{RAD}(2A)))$	2	2	720	Reciprocal spiral
$5^2 \cos(\text{RAD}(2A))$	2	None	360	Parabolic spiral
$\text{SQR}(5^2 \cos(\text{RAD}(2A)))$	2	2	720	Litus
$5^2 \cos(\text{RAD}(2A))$	2	None	360	9 petals
$5^2 \cos(\text{RAD}(2A))$	2	None	360	4 petals
$5^2 \cos(\text{RAD}(2A))$	2	None	360	4 petals
$12/(5^2 \cos(\text{RAD}(2A)))$	5	None	360	ellipse
$12/(5^2 \cos(\text{RAD}(2A)))$	2	3/2	720	'Flower head'

which is represented by $(\frac{1}{2}, 0)$
End angle 360

The computer will now go on to display the graph which in this case is called Bernoulli's Lemniscate (∞ in shape).

of the way I have used error trapping within the program, if you Escape into it you will be unable to re-run the program. To overcome this set up a user-definable key as follow:
*Key 9 Print 0/0|M Run|M
To re-run merely press this key.

```

10REM+-----+
20REM+ Polar Co-ordinates +
30REM+ By +
40REM+ R. Crook (C) 1984 +
50REM+-----+
60ON ERROR GOTO 280
70%=%20101
80MODE 7
90VDU:23:8202:0:0:01
100PRINTTAB(5,5):CHR$(131):CHR$(141):"POLAR CO-ORDINATES":PRINTTAB(5,6)
    CHR$(131):CHR$(141):"POLAR CO-ORDINATES"
110INPUT TAB(5,10):"Equation:r=":E$
120INPUT TAB(5,12):"Increment":I
130INPUT TAB(5,14):"Any roots operating":T$
140IF T$="Y" OR T$="y" THEN INPUT TAB(5,15):"Root=(1/?)"  

    (As a fraction):R$:PROCDemo
150IF T$="Y" AND T$="y" THEN R$="0"
160R$=EVAL(R$)
170INPUT TAB(5,18):"End angle":F$
180IF F$=0:INT(F$) OR I$=0 THEN CLS:GOTO 120
190IF R/2=INT(R/2) AND R>0 THEN G$=1 ELSE G$=0
200IF 0<C<0:A=0:H=0:DIM X(F/I+2),Y(F/I+2),AX(F/I+2),AY(F/I+2)
210X(C)=COS(RAD A)*EVAL(E$)
220Y(C)=SIN(RAD A)*EVAL(E$)
230G=1 THEN CO=C0+1:AX(CO)=-X(C):AY(CO)=-Y(C)
240IF ABS(X(C))>H THEN H=ABS(X(C)):AN=A:S=0
250IF ABS(Y(C))>H THEN H=ABS(Y(C)):AN=A:S=1
260IF ABS(Y(C))>H THEN H=ABS(Y(C)):AN=A:S=1
270C=C+1
280IF ERR=17 OR ERR=25 THEN CLS:REPORT:END
290A=A+I
300IF R(F+I) THEN 210
310TP:C
320PROCScale
330MODE1:GCOL 0,3
340COLOUR2:PRINTTAB(0,31):"r=":E$
350PROCDraw
360+F$X15,0
370+DEY:RUN
380END
390DEFPROCscale
400IF S=0 THEN SX=500+COS(RAD AN)/H ELSE SX=500+SIN(RAD AN)/H
410SC=H/S
420ENDPROC
430DEFPROCdraw
440R=$00
450REPEAT
460ANGLE=0
470MOVE$0+R*COS(RAD ANGLE),512+R*SIN(RAD ANGLE)
480REPEAT
490ANGLE=ANGLE+20
500DRAW 640+R*COS(RAD ANGLE),512+R*SIN(RAD ANGLE)
510UNTIL ANGLE=360
520R=R+100
530UNTIL R=0

```

continued over the page

```

540VDU 29,E0:5121
550PROCPLOT("X","Y")
560PROCPLOT("AX","AY")
570VDU 5
580GCOL 0,3
590X=0
600REPEAT
610MOVE X,0
620PRINTX/100+SC
630X+=100
640UNTIL X=E00
650GCOL 0,2
660MOVE E10,0:PRINT"E"
670ENDPROC
680DEFPROCPlot(R%,B%)
690MOVEA,0
700C=0:X=0
710REPEAT
720GCOL 0,2+X
730=NOT X
740PLOT E9,SX+EVAL(R$+"("+STR$C+")")
    "1,SX+EVAL(B$+"("+STR$C+")")
750C=C+1
760PLOT E9,SX+EVAL(R$+"("+STR$C+")")
    ,SX+EVAL(B$+"("+STR$C+")").
770PLOT E5,0,0
780UNTIL C=TP
790ENDPROC
800DEFPROCDefonm
810L=LEN(R$)
820A=1:I=1
830IF MID$(R$,A,1)="/" THEN K=A-1
840A=A+1
850IF A<L+1THENB30
860R$=MID$(R$,1,K)
870ENDPROC

```

In case you were wondering what had happened to the end of Charis Charalambous' sound enveloping program printed last week — we ran out of space — so here it is!

```

1790 DEFPROCCLEAR
1800PRINTTAB(0,10)SPC39;TAB(0,25)SPC39
1810ENDPROC
1820*****
1830DEFPROCSD(H%):PROCSOUND
1840F%=4HZ
1850SOUNDHZ,E(X(16+P%),E(X(17+P%),E(X(18+P%
1860ENDPROC
1870*****
1880DEFPROCSD_OFF:#FX15
1890ENDPROC
1900DEFPROCINSTR
1910VDU19,1,11;0;19,0,2;0;19,3,0;0:COLOUR3:CLS
1920PRINT""This is an envelope definr, making
use of the BBC's envelope abilities."
1930PRINT"You are displayed with the current
envelope's & sound's parameters."
1940PRINT"Use the cursor keys for moving the
arrow (";COLOUR2:PRINT;CHR# 255;COLOUR3:
PRINT"); around."
1950PRINT"The first parameter is the env. number
and you can change whatever you like."
1960PRINT"The program tests for invalid entries
so experiment with any number you want."
1970PRINT"The function keys do the following..."
1980FOR F=0 TO 3:COLOUR2:PRINT;"F":I:COLOUR3:PRINT;
    STRING$(10,.);;"SOUND'S CHANNEL :F":NEXT
1990COLOUR2:PRINT;"F";:COLOUR3:PRINT;STRING$(10,.);;
    "Stop's all sound".
2000COLOUR2:PRINT;"F";:COLOUR3:PRINT;STRING$(10,.);;
    "Moves you TOP_LEFT".
2010COLOUR1:PRINTTAB(5,30)"PLEASE PRESS SPACE/BAR";
    REPEAT:UNTILGET=32:VDU20:CLS:ENDPROC

```

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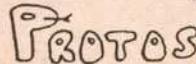
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Open Forum

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed.

Radio alphabet

on Spectrum

Radio Alphabet is a short listing that converts the message typed in into the standard radio alphabet. This is used by

aircraft, ships etc because the words produced cannot be mistaken as letters might be (for example 'f' and 's' often sound alike on radio).

When using the program, substitute asterisks (*) for spaces. Messages should be no longer than 300 characters, although this can be changed by altering Line 20. The

program is especially useful if you are trying to learn the radio alphabet. There are some slight variations on the alphabet, such as India which is commonly known as Indigo, but this is the world standard version.

Program notes

Line 5	Pokes caps lock on
Lines 10-20	Define arrays.
Lines 40-60	Scan input for spaces and end of message
Lines 70-120	Read from data statement and print words
Line 130	Jump back to input routine.
Line 140	Single data statement containing all words in alphabet.

```
1 REM RADIO ALPHABET
2 REM ALAN PERSSE 1984
5 POKE 23658,8
10 DIM X$(9)
20 DIM Y$(300)
30 INPUT "ENTER MESSAGE"; LIN
E Y$
40 FOR Z=1 TO LEN Y$
50 IF Y$(Z) = "*" THEN LET X$ =
" "
50 IF Y$(Z) = " " THEN GO TO 30
70 FOR W=1 TO (CODE Y$(Z)-64)
80 READ X$: NEXT W
90 RESTORE
100 PRINT X$( TO )
120 NEXT Z
130 GO TO 30
140 DATA "ALFA", "BRAVO", "CHARLIE",
"DELTA", "ECHO", "FOXTROT", "GOLF",
"HOTEL", "INDIA", "JULIET", "KIL
O", "LIMA", "MIKE", "NOVEMBER", "OSCAR",
"PAPA", "QUEBEC", "ROMEO", "SIE
RRA", "TANGO", "UNIFORM", "VICTOR",
"WHISKEY", "X-RAY", "YANKEE", "ZULU"
```

Radio alphabet
by Alan Persse

Arcade Avenue



Panic time

Ultimate games week. First off let's deal with the letters I have had about *Sabre Wulf*. Gerald Dawson of Kenilworth has finished the game with a score of 100,820 even though he was not "playing for points". He tips us that the four medallions pieces are found in any of the 25 dead end clearings and, of the incredible 256 locations, 71 need not be entered at all.

Guy Fothergill of Leicester has completed the game with 68% and 76,965 points and has mapped 251 of the rooms.

Many thanks to Michael Smith of London who as well as

sending in a score of 220,110 and 89% has offered many useful hints:

- 1) Look out for red rocket shaped objects (statuettes) as these give you extra lives. The program only allows me nine extra lives - this is a bug.
- 2) Keep fight button pressed whilst moving as monsters appear in your path.
- 3) Use the orchids as much as possible except the white.
- 4) Do not stay too long on the same screen or the fireball appears - move on to a new screen and then return and it will have gone.
- 5) The medallion pieces look like flashing parts of a jigsaw puzzle.
- 6) If in trouble move between two screens near an orchid bud until it blooms - the blue flower is best as it doubles your speed and makes you invincible.

Paul Holden of Bolton, whose

best score is 49%, warns that the flames and the Sabre Wulf are both invincible and fatal if touched. He explains that yellow orchids stop you but clear all hazards on the screen, red orchids either slow you down or make the keys work in reverse, although they do make you invincible, white orchids return you back to a normal state.

On to *Atic Atac*. Thanks to Steven Stoner of Southampton who has scored 99% (as has his mum whilst his seven year-old brother has scored 89%) for the following tips:

- 1) Always keep your finger on the fire button as this will save you in times of panic.
- 2) Open as many coloured doors as possible as this increases the percentage. They will remain open.
- 3) You must assemble the parts of the AGG key in the correct order in your scroll before

passing through the main door.

4) The cross makes Dracula back off, the bag of money lures the hunchback away from the door and the spanner will destroy Frankenstein.

5) Although the keys and the AGG parts do appear with some randomness the same locations occur fairly often — so note them down.

Steven is keen to know if 100% is possible or is it an unobtainable goal to keep people playing. So please write in and let me know if anyone has done it.

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to: Tony Kendle, Arcade Avenue, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Areas

on Vic20

The program calculates the approximate area under the graph of a function defined by the user. This will be a useful check for many problems in mathematics and physics.

The function is defined in Line 100, and in listing provided is the square root of X. The

program can thus be modified for other functions by altering the definition of function.

Once the required function has been declared the program can be run. The computer asks for the lower and upper limits which correspond to the X-coordinates between which the area is to be worked out. The upper limit must always be greater than the lower limit, if not the user is asked to input new values.

After the successful input of the limit the

program calculates an approximate value for the function defined, using Simpson's rule. This is then printed out.

Variables

Function A contains the equation of the graph.

LL = lower limit

UL = upper limit

NS = number of strips

H = strip width

SM = area under the graph

X = x co-ordinate

Y = y co-ordinate

C = counter

```

2 REM AREA APPROXIMATION
3 REM COPYRIGHT
5 REM ***CALCULATE AREA***
10 PRINT "A"
90 REM ***FUNCTION***
92 REM
95 REM
100 DEF FNA(X)=SQR(X)
200 INPUT "LOWER LIMIT ";LL
210 INPUT "UPPER LIMIT ";UL
220 IF UL<LL THEN PRINT "UPPER LIMIT MUST BE > GREATER THAN LOWER LIMIT!" : GOTO 200
230 PRINT "PLEASE WAIT,          CALCULATING AREA."
250 NS=1000
300 H=(UL-LL)/NS
350 SM=0:X=LL
400 FOR C=1 TO (NS-2) STEP 2
500 LET SM=SM+(4*FNA((C*H)+X)*H/3)
600 LET SM=SM+(2*FNA((C+1)*H+X)*H/3)
700 NEXT
800 SM=SM+(FNA(LL)*H/3)+(FNA(UL)*H/3)
900 SM=INT((SM*10)+0.5)/10
1000 PRINT "THE AREA IS";SM

```

Areas
by I Shambrook

GW6JJN

Roving radio

A new company called Crystron is marketing a 'Black Box' — its name, not mine — which is designed to help companies keep in touch with their employees on the road. The Black Box is basically an interface with converts information received over the air into RS232C format suitable for a portable terminal rather like the Tandy Model 100. It works from a car battery so that the company employee can sit in his or her car with a two-way radio, the Black Box

and the portable terminal, and communicate with the company's central computer.

Operating on ultra-high frequency (UHF) the range is about a hundred miles or so. The company computer will act as a base station Black Box and be able to 'talk' to the car. The purpose seems to help field sales people work out quotations and be aware of stock, etc, as well as to place orders directly. With a price tag of £1500 per mobile unit and around £4000 for the base unit it's a bit beyond me but I'm sure someone will find a use for it.

If you worry about losing your software on tape or disc during a major fire, Inmac, the computer consumables people, have the answer for you in the shape of their data-safe. It has been tested to 1090°C in a special oven and the software survived. So for

£450 pounds or so you can sleep peacefully in the knowledge that if your home and all its contents are burned to a crisp, your favourite computer game will make it.

Many of you write to me about the radio-frequency interference (RFI) that your computer clock gives out causing havoc to radio transmission and reception, usually when using a radio teletype system. There is no completely satisfactory answer to this, although much can be done to alleviate the problem by using various screening devices from metal foil to biscuit tins.

I was reminded of the problem recently when reading a press release from a company called Grid System Inc. It would appear the Ministry of Defence have a similar problem in that data transmissions from Embassies and the

like must not give out RFI in case someone may be listening who can make some sense of it all.

The Ministry set a standard as regards RFI screening which is met by the Grid 1107 portable computer. With 512K Ram and 38K of bubble memory, it comes in two versions: shielded and unshielded. The unshielded version is £5,195 and the shielded version is £10,500. What price radio interference now, you might well ask...

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Open Forum

Tandy convert

on Dragon

This is a program to convert any Tandy Basic program into Dragon Basic. It is a short machine-code routine loaded in as

Basic data statements. To use the program simply load in the routine and load in the Tandy Basic program. Then type Exec 32600.

```
0 PRINT"decodeBASICprogramsFROMtandy":PRINT
1 REM 1983 COFFINET ETIENNE 1984 COLINA JULIAN
2 CLEAR200,32599:FOR A=32600 TO 32720:READC:POKEA,C:NEXT H
3 PRINT"CLOAD decode & CRUND REMEMBER:EXEC32600]
":PRINT:PRINT"CLO AD TANDY PROGRAM & EXEC32600 THEN RUN NEW
PROGRAM FOR DRAGON & CSAVE ITSEL. ALL IS O.K. !!! "
4 DATA 190,0,25,48,4,188,0,27,44,62,230,128,193,0,39,243,
193,255,39,22
5 DATA 193,141,35,237,16,142,127,161,16,148,127,181,39,227,
225,164,35,28,49,34,3 2,242,230,128,193,130,35,213,16,142,127,
181,16,140,127,209,39,203,225,164,35,4,4 9,34,32,242,235,33,
231,31,32,189,57
6 DATA 150,1,163,2,166,23,180,24,184,241,185,223,186,212,203,
239,204,242,205,0,1 31,30,132,0,133,3,141,6,147,8,148,247,150,
244,151,240,152,252,153,237,154,233,15 5,234,156,249,161,255
```

*Tandy convert
by Julian Conlina*

Baud Walk



PSS - certainly

News comes first this week about two new bulletin board services that have sprung up lately. The first one is at Nottingham and supports 1200/75 baud modems using standard terminal software. Telephone number is 062 289 783 - and it's open 24 hours a day too.

The second service I have heard of is to be operated by BASUG, the UK Apple Users Group. This will be a multi-baud rate board (300/300 1200/75) and the telephone number is 0268 778956. This should be a good service as BASUG has plenty of experience, information and public domain software to offer.

We also heard about a new

cassette magazine that is being specially written for Spectrum users who have a modem (in most cases these will be owners of the VTX 5000) and really want to get into communications. Apparently the author is an avid hacker who regularly uses services like Prestel, Compuserve (the American version of Prestel) and the like.

On to some more serious communicating, I thought I should look at PSS; it's the Baud Walk equivalent of American Express in that you need a healthy bank balance, but it does very nicely thank you!

PSS is BT's data network which allows you access to databases and services not only in the UK, but all around the world. A number of service operators offer PSS connection to their system as it has a number of local call points in the UK - thus avoiding STD calls.

Users of PSS have to take out a subscription to the service - but the advantage is in the long distance connections. For example, a 30-minute call to

London on STD costs around £2.47 - using PSS it's. The more you use PSS - within reason - the quicker you will recover that subscription charge, at least that's the idea.

In fact, PSS is not dependent on distance for tariff charges in the UK - and this only partially applies to international access to - but depends on the amount of data you send along the wires. UK calls can cost as little as 2p a minute and a typical connection to the States around 12p per minute.

Full details about PSS can be obtained from BT Marketing on 01-920 0661, or better still, try your local librarian. Who may be able to give you good advice and recommend reading a database directory. On my reckoning, the States has at least around 1000 databases - some commercial and private, but other public, plus, or course, bulletin boards.

PSS differs from the normal telephone network in that it is tailor-made for digital communications - in other words for micro communications. In fact, BT appears to be about to offer

more digital services next year that could well offer a cheaper alternative to PSS. Apparently a 300/300 network will be tested next year and it will be cheaper than the normal telephone network.

If you have access to a PSS account try the following numbers for overseas databases but remember the cost.

Source # 01 01 703 734 7500
Compuserve 01 01 313 769 6800
Telenet # 01 01 703 442 1363
Tymnet # 01 01 408 446 7000
Uninet # 01 01 913 341 9161

If you are feeling really adventurous, why not get an information pack from Compuserve. Write to Compuserve Inc, 5000 Arlington Boulevard, Columbus, Ohio 43292, USA.

Robin Wilkinson

Baud Walk is a new weekly column with news on networking, databases, reviews of modems and software and points of contact for information.

Any readers with experience of networking are asked to send their experiences or news of services to Robin Wilkinson, Baud Walk *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

He can also be contacted on Prestel mailbox 019983727.

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HISoft DEVpac 3

... DEVpac is most highly recommended. The documentation is first class." Your Computer May 1983

... if you write programs in machine code, buy DEVpac — it is the best currently on the market." Adam Denning, ZX SOFT in Which Micro September 1983

Two comments from reviews of earlier versions of DEVpac — now we have DEVpac 3 available: a powerful Z80 assembler with conditional assembly, assembly from tape (to enable generation of very large code files), EQU, ORG, DEFB, DEFS, DEFW, DEFN, labels of any length — in fact all you need for fast (0.000 lines per minute) and powerful assembly programming. But it doesn't stop there: DEVpac 3 also includes an incredible debugger/dis-assembler giving you a 'front panel' display of the Z80 system and allowing extensive debugging of your machine-code program, including single-stepping programs EVEN IN ROM!! Open up the secrets of low-level programming with DEVpac 3.

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Tony Bridge's Adventure Corner



Across the pond

There's a well-used saying which is especially rampant in the computer world, that what is currently popular in the United States will one day be imported to Britain. The common feeling is there is usually a delay of several months before we see the best selling software from America. This is not to say that the software from across the Atlantic is necessarily better — programs such as *Lords of Midnight*, *Valhalla* and *The Hobbit* would be received with ecstasy over there; but it is true to say that there are many adventures there that, thanks to the widespread use of the disc drives, are much more complex than is the norm in Britain.

Assuming, however, that with the popularity of the CBM64, Apple and Atari, we can expect to see American adventures in the next few months, let's see what is brewing over there.

Available now, on disk and cassette for the Commodore system, and soon for the Atari, Apple and IBM-PC/PC Jr. (the latter system is looked on very much as a home computer in the States), is *Dallas Quest*, from Datasoft, the company that bought you *Zaxxon*, among other great arcade games.

The lifelike scenes draw the player into the sumptuous Texas mansion of Southfork and then into the steamy jungles of South America to rub elbows with, and outsmart, crafty J R Ewing. In the game, you take the part of a world-famous detective, who in solving the challenge of each scene, must find the map which reveals the whereabouts of a South African oil-field.

Adventure Helpline

Going bananas? If you are stuck in an Adventure with nowhere to turn do not despair — help is at hand.

Fill in the coupon, explaining your problem,

"Interactive Fiction" is the latest buzzword in America for adventures, and Spinnaker Software, authors of such education-orientated software, have taken advantage of the name and come up with several programs adapted from classic novels.

It's a route that others have taken (as in *The Hobbit*, the best-known that we have here), but Spinnaker's adventures are aiming for a wider audience, with titles such as *Swiss Family Robinson*, *Wizard of Oz*, *Gulliver's Travels* and *Below the Root* (based on the Green Sky Trilogy). The adventures allow the use of full sentences and support full graphics. Most are of the traditional variety, with puzzles to be solved; but *Below the Root* is more of a Monster-Bash, with the player moving around a graphic landscape as in *Ring of Darkness*.

The target audience of this range of games seems to be rather young, and it would seem to be a good series with which to learn about adventures. Other titles in the series, to be released later this year, are *Wind in the Willows* and *Treasure Island*.



Arthur C. Clarke

"Suddenly, quietly, inexplicably, a huge new asteroid appears in the Solar System. After lengthy observations, the impossible explanation becomes the only one: the asteroid is actually a spaceship. Mankind must attempt a rendezvous". If this sounds familiar, it's not surprising, as it is the plot of a new adventure based on Arthur C. Clarke's *Rendezvous with Rama*. But read on:

As luck would have it, the only spaceship close enough is your own — the Endeavour. You must explore the asteroid and, if you are lucky, return to Earth. Trillium is a name that Spinnaker Software has adopted for a series of adventures based on well-known Science Fiction titles. Clarke's classic is the first, and others will follow from Robert Heinlein, Alan "Alien" Dean Foster, Ray Bradbury, Michael Crichton, Phillip Jose Farmer, Alfred Bester and others.

These adventures will be available for the

send it to us, and a fellow adventurer may be able to help.

Remember — the system only works if those adventurers who have solved the puzzles get in touch. Every week is Save An Adventurer Today (SAAT) week!

usual mix of Commodore 64, Apple and Atari machines, but the interesting thing about them is that they have been written with full co-operation of the authors — so the story-lines will be pretty good.

A new release from Infocom is always worth waiting for, and their new adventure, *Seastalker*, is no exception. This one has you undersea, and the mission is to rescue Aquadome, "the world's first undersea research station", from destruction.

Infocom calls this a beginner's adventure, aimed at younger players. In fact, one of the authors, Jim Lawrence, has written many of the Nancy Drew and Hardy Boys mysteries.

Seastalker comes with the usual brilliant Infocom packaging, which in this includes a unique Help Decoder, which can be used to reveal one clue at a time.

Quest of the Space Beagle, as befits its subject, is a huge program, covering four disc sides — it's the sequel to the even bigger *Jupiter Mission 1999*, which filled a staggering eight sides. As you might guess, your role in both the programs is to, yup, save the universe again, but the authors have really gone to town and created a sprawling, complex adventure which includes stunning graphics, arcade sequences and plenty of strategic planning. It's from Avalon Hill for the Atari.

For the Commodore 64 is *Ripper!*, a role-playing adventure game that puts you in the shoes of the detective responsible for tracking down old Jack. If your IBM-PC is lying idle, how about treating it to *Diplomacy*? Not strictly adventure, I know, but I think this is the first version available for a computer.

Also for the IBM only, but soon for the Apple, is a very interesting-looking program from Sierra On-Line who brought you *Frogger*, *B C's Quest for Tires*, *Dark Crystal*, *Cranston Manor* and the Ultima series. It's a graphic adventure, which includes many animated sequences and joystick control.

The Americans seem, to me, to be quite a long way behind us when it comes to graphic adventures — a program like *Valhalla*, for instance, now that it is available on the CBM64, should become a huge hit in the States, where complex sentence recognition and input is only just making an appearance in graphic adventure.

Still, it promises to be a busy time over the next few months for us adventurers, and I think we are going to reap a lot of benefit from all the research that programmers have done with arcade games.

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further write to: Tony Bridge, Adventure Corner, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

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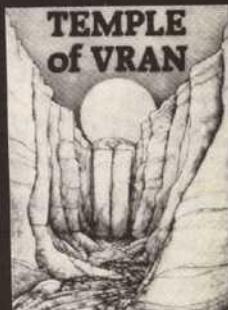
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Squiggles

David Stevenson of Tipton, West Midlands writes:

Q Our family owns a ZX Spectrum and we have almost mastered the art of programming in Sinclair Basic. When I say almost I may be exaggerating, but there is one thing that gets on my nerves: The number of characters used in the extended mode which we hardly ever use — such as the tiny little squiggles and many others. I would like to know if there is any way that we can use any of these hindrances to extend the 21 graphics characters available? I'm sure many other Spectrum owners would like to be able to put more graphics into their programs and so would I. I am in the middle of a program and I used 18 graphics just making a man dive to the floor.

A Page 173 of the Spectrum manual describes (among others) a system variable called *Char\$*. The description of this variable states that you can define your own character set in Ram and make the Spectrum use it by making *Char\$* point to it. This can be achieved by copying the character set into Ram and you can then change any character you wish (even the little squiggles) to whatever you like.

Unpredictable

R Bain of Sherwood, Nottingham writes:

Q When I poke address 53272 on my CBM 64 in the range 0-255 and then *Poke* the same address, only in

some cases is the *Peek* value the same as the *Poke*.
ie *Poke* 53272,0;*Print Peek* (53272) gives value 1.
Poke 53272,1;*Print Peek* (53272) gives value 1.
Poke 53272,2;*Print Peek* (53272) gives value 3.

Only odd numbers are returned, can you tell me the reason why this should be?

A Address 53272 is used by the Vic memory control register (mentioned on page 104 of the *Commodore Programmers Reference Guide*). This address is used in conjunction with address 53265 to set up a high resolution bit-map in memory eg. *Poke* 44,54;*Poke* 16384,0;*New Poke* 53265,*Peek*(53265) Or 32 :Rem turns on bit-map mode *Poke* 53272,(*Peek*(53272) And 240) Or 8.

These instructions set the start of Basic memory at 16385, and use locations 8192 to 16383 to store the high resolution bit-map. As to why the value changes, I would think that as this location on its own is used by the screen refresh routine (amongst others) and that its value is probably quite unpredictable.

Going off

P Reynolds of Euxton, Lancs writes:

Q I am writing to you to see if you could solve a problem of mine. I have had a 16K ZX81 for over a year and have just purchased an AGF interface. Now, suddenly the computer goes off, but when I take the Rampack off it is all right. Please could you tell me what to do.

A It looks as though your Rampack has developed a fault. It may be just coincidence that it occurred at the same time as your purchase of the interface, or it may be that in fitting the interface you unwittingly damaged the connectors on the Rampack.

As you are out of your guarantee period, your only solution is to get your Rampack repaired. A firm near you, PV Tubes, 104 Abbey Street, Accrington, Lancs, will be glad to estimate for a repair on your machine. I have had a number

of letters from readers who have had excellent service from this company, whose prices are also very reasonable. They can be telephoned on (0254) 32611.

would receive would be the same duplicated sheet. What else can I do?

A Line 2090 in my copy of the book reads: 2090 IF K=5 OR VAL K\$=ZE OR VAL K\$=LN THEN GO TO MR

I have deliberately typed all the variable names in upper case because it seems to me that you may have confused the lower case L in LN with a 1. This would result in a Nonsense in Basic message being produced for that line.

If this is the cause of your problem then you will have to check through the rest of the program to make sure that you have not been misled elsewhere.

Failing that, if you could get your version of the program listed (as you typed it in) I will be glad to investigate the problem further for you.

Gone dud

R B Charles of Glasgow writes:

Q I want to replace a Z80A CPU as the one in my Spectrum has gone dud. Will a Z80A CPU from any dealer do the job, as I have been told that I would need to get a special Z80A CPU?

A It would be as well to purchase components designed to work within the Spectrum. R A Electronics supply Spectrum Z80A CPUs at £3.00 (including postage and packing). Their address is 30 Kimberley Road, Lowestoft, Suffolk.

Nonsense

Richard Smith of Birmingham writes:

Q Having bought the much recommended book *Spectrum Machine Language for the Absolute Beginner* published by Melbourne House, I first read through it and found it very useful. But then I decided to type in their *Ezcode* machine code monitor. This was when the trouble started. The program did not work. The problem occurred at Line 2090 and gave a *Nonsense in Basic* error. Finding the program impossible to debug, I wrote to Melbourne House.

They sent me back a duplicated sheet with about five mistakes on it. Therefore I typed in the program again without these errors. Again all I got back was the same error.

If I wrote to Melbourne House again I feel that all I

Monochrome

Peter Mutitsch of Glasgow writes:

Q I have a problem with my Issue 2 Spectrum, in that the colour on my Sanyo portable colour TV isn't. Originally when I got the TV, the display was black and white, so I adjusted the computer internally to get the proper colours. Unfortunately the TV was not properly on channel, so that if I changed channels then changed back again the picture went back to black and white. Shortly after this I returned the TV but the colour still is not right.

A Issue 1 and 2 Spectrums are notorious in this respect I am afraid. The Issue 3 machines are very much better in this area. There is not a lot I can suggest for you to do. I presume that since returning your TV you have tried re-adjusting the computer internally with no success. Apart from that there is not really anything you can do.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Phil Rogers and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD*

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16KZX81 + 5 S/W tapes swap for spectrum hardware write to: A. Mahmoore 31 Webbex House Nath Street Barking.

ZX81 + 16K S/W + dictator for £45 00 Tel 0762 42603.

ZX81 Ram Pack 16K, made by Memotech, very good conditions, boxed, still working: Sell £20.00 , Tel: F. Karin 937 5764.

ZX81 16K, RAM, 9 cassettes, boxed, £45 Tel: 01850 — 2759 after 6 p.m.

ZX81 16K Dean keyboard recorder large collection of software and books £75 onto phone 673 3491 after 7pm.

48K SPECTRUM + fuller keyboard £100 microdrive + 1/1 £80 ZX Printer £30 recorder £15 L Print interface £10 Valhalla, Auto monopoli, football manager, pascal, devpac speeds HT, Tasmodem beta, basic superchess utilities, books, offers. 0924-25797.

1KZX8116K Ram fuller keyboard 15 games including glaxians, defender

WAY TO BEAT ATTACK!



Rochdale 341111

printronic T.V. game with 10 games QL ordr form, calendar, program 41 listing including caterpillar, 2 grand prix grandstand soccer game over £10 worth of mags Bargain price £500 Mr E. Mitchell, 52 Bycroft Road Southall, Middle UB1 2XQ.

ZX81, 16K Ram approx ten games and six magazines all leads power pack and owners manual included cost the new approx £60 will accept £30 o.n.o. 36 Norfolk close Redcar, Cleveland.

ZX81 1K 25% S/W all original psst, zoom, cookie, the Hobbit, collage adventure Black crystal and organes master £22 for the Col Tel 0274 08995.

16K 2x81 S/W inc: 4 g'er flight simulates, Crazy Kong, Football, manager, very good conditions. All original tapes, Tel: 01 251 0539. or will swap.

ZX81 Printed — Power Cable — 3 reels of Printed paper — £130 ono. Tel: 01 888 - 4923 — Mr Allan.

ZX81 S/W, Pixel Trader JRS fast loader system, carnell compendium, (6 programs) Sinclair History + Inventions, books, understanding ZX81 ROM, ZX81 Pocket Book, £12 ono. Tel: Dave, Stevenage 69447.

ZX81 S/W £10 00 games Inc: Back gammon 3D defender 30 grand prix, flight simulator, through the wall + scramble. All original games. Tel: (0792) 298235.

Acorns for sale

BBC 'B' 1.2 Eprom monitor + toolkit. Books, games etc: £325 ono. Tel: 01 229 0350. Tues-Thurs 9-5.

BBC 'B' 1.2 OS. Some s/w, leads £330. Steve (even) Tel: 01 736 2542.

BBC B with Acorn DFS, joystick, cassette player and software including Flight Simulator, Planeteid, Snapper, Philosopher, Quest. Good condition £420 ono. Tel: 01-736 9504 even. Ask for Richard.

KENDA DMFS/DOS for BBC. Double density. No user RAM taken up. CP/M filerames. No limit to number of files. Recover erased files and lots more. £80 ring Rajiv 01-204 1908.

BBC B Salamander 737 Flight Simulation £5.00 Program Power Galactic Commander £3.00 Acornsoft Arcade action £5.00. Buy all three for only £10.00 Spectrum 16K Quest's Black Hole" £4.00 originals only. Witchampton 840 354 w-e only.

FOR SALE SOFTWARE for BBC Model B 14 different programs. 5 program power. Chess, Croaker, Killer Gorilla, Alien Swirl, World Geography, Quicksilva Music Processor, Trench. Offers, Phone Barnsley 764481 after 6pm. **OVER £300** of original s/w for BBC + Electron micro. All kinds at 6 3rd prize. 0255 814523.

BBC MODEL B 1 month old. £340. inc: joystick + games. Tel: Walsall 883365.

FORD CLASSIC vintage collectors car G.C. Swap for CBM 64 or BBC with peripherals. Mr Cox Tel: 0952 51628 after 6pm.

ACORN ELECTRON Leads box 5 months guaranteed signpoint quick joystick 1 6 books 8 games cassette recorder magazines elbug electron uses all for £300 ono Tel: Leon on 870 — 1884.

BBC-B S/W: Space arena lead for centipede, Atlantis, galaxy wars defence. £3 each write to W.L Tang, 6 North Farm Road, Lancing West Sussex, BN15 9BS. All S/w original.

BBCSoftware for sale all originals mysterious adventure, philos quest snowball Arcadians Arcade Action £4 each French cocats test £5 must go! Phone 0788 812940.

BBC B 12 O/S, Leads, S/W + Data base, offers one £300 tel : Steve 01 — 738 2542.

ACORN ELECTRON Interface quickshot joystick + cassettes recorder £100. S/W subscription, books, manuals, dirt cover, offers Tel: 742 446.

TEAC DOUBLE sided 40 track disk drive. With cables for BBC — £150 ono. Tel: 0302 840 768 eves.

ACORN ELECTRON software to swap. Pedro, Felix, Moonbase Alpha, Moonraider, Swoop, Adventure, Lt Bertron, Chess, Snooker, Pengwyn, Killer Gorilla, T.K.V., Chuckie Egg. Write to P. Jess 58 Legacury Road, Lisburn, Co. Down, NI.

Ataris for sale

ATARI 800 — 810 disk drive, joysticks, books, mags. Over 1000 worth of s/w. Exchange for Apple or sell separately for £750 ono. Tel: Blackpool 852850.

ATARI 48K, complete with new tan tan 1010. About 4 months old. Point Master joystick + books. £185. Tel: 0285 67174 evenings.

ATARI 400 48K with keyboard, tape recorder, 2 pointmaster joysticks, light-pen, paddles, Defender, Star Raiders, Centipede. Basic cart. 4 learner tapes, game tape, 8 learner books + menus, mags etc. £500. Tel: Upminster 27275.

ATARI 400 16K with assembler and Star Raider cartridges, cassette and operating system plus Dens Atari manuals plus games £130 ono. or swap for 48K Spectrum + software. Tel: Gosport 520412.

ATARI 800XL 64K. 4 months old. £200. Astro chase, Ghost Hunter, Claim Jumper, Action Quest cassettes £13 each. Golf Wizard of Wol. discs £17 each. Tel: 0543 72055.

ATARI software for sale. All original Dig Dug cartridges £15. Canyon Climber cassette £5. Lone Raider cassette £8. Tel: Mark on 0450 76865.

ATARI 400 with 2 joysticks and program recorder. Seven cartridges including Star Raiders, Dig-Dug, Pole Position, Chess, Zaxxon, Scram and many others on cassette. Cost £350. Want only £90. Tel: Wokingham (0734) 75853.

ATARI VCS for sale. 10 games inc. Enduro, Pitfall, Pacman and The Empire Strikes Back. Cost £350, will sell for £115 ono. Tel: Mark, Fareham 281137.

ATARI 600XL + 54K memory module, + cassette. Lots of Atari s/w + manual. All as new £250. Tel: Oxted 7496 evenings...

ATARI 800XL £160 or exchange for 850 interface, printer cable and £80. Tel: Farnham Common 4052.

ATARI VCS Combat, Star Raiders, Asteroids, Air Sea Battle £80. Tel: 949 7464.

ATARI 800XL 64K. 1050 disk drive, with dos 3 master disket 2, 1010 cassette recorder 850 interface. All new, guaranteed. S/w £700. (originals). Complete unit £650. Tel: 864 5613.

ATARI 600 XL, cassette deck, wooden case, joysticks, games, £140. Tel: 01-399 2669.

ATARIS/W for sale. All originals cartridges, alinette disks, fantastic Prices — Tel: Mark (0225) 742777.

ATARI 600 XL, galaxians cartridge joystick 2 basic books, £100 ono. Tel: Chester 679 329.

ATARI 400 basic H manual, 6 months £75 tel 01 359 1177.

ATARI 800 XL and 1010 recorder over £300 worth of S/W 2 joysticks, books H manuals all 6 months old please ring 01 — 688 7072 First offer around £375 secures.

ATARI 400 32K. Qwerty keyboard Basic cartridge, manuals, games inc. Pole Position plus joysticks and recorder sell for £136 ono. Tel: Peter 851-9929.

ATARI 800, 48K & 410 Program Recorder with dust covers, manual, magazines & 4 books + various software £150 onto Waford (0923) 268838 (evenings & weekends).

ATARI DISK + cassette s/w for sale. Le Shamus, Preppie, Poolyarn, Savage Island etc all original. Reasonable offers please! Tel: 051 877 8642.

ATARI 800 48K + 10-10 recorder + joystick, basic cartridge + manuals + books. Also some s/w. All boxed, not 1 year old. £24.00 ono. Tel: 0842 4431.

ATARI 600X2 computer complete with data recorder and joystick as new. Unused. Offers, or exchange considered. Liphook 0426 722975.

ATARI 600XL 16K with tape recorder 4 original cassettes 3 cartridges inc Donkey Kong Pole Position and Defender Atari joystick 1 book manuals still boxed £200 East Peckham 871735 worth £310.

ATARI V.C.S., 23 cartridges, joysticks, paddles, boxed, v.g.c. £370 ono. Tel: Saddleworth 2518. Sat. mornings only. (ask for Martin).

ATARI VCS and joystick and paddles. Plus £250 of games v.g.c. cartridges top-sellers like Pole Position, Super Cobra, Tulankhamen offers? Tel: Dorking 887169.

ATARI 800 plus recorder plus twin disk drives plus Star Gemini printer all immaculate. £650 onto quick sale needed. Phone Basildon (0268) 285406 evenings weekends.

ATARI VCS with 3 joysticks, paddles etc and seven tapes inc. Defender, MS-Packman Missile Command, Adventure, Haunted House, ET, Combat Worth £230. Sell for £70 Tel: 041 632 0592.

ATARI 400 48K with keyboard, 4 cartridges, tapes, joysticks, manuals etc. £480 Tel: Upminster 27275.

ATARI 600XL under guarantee till January £100, still in box Phone Wrexham 753238.

ATARI CARTRIDGES for sale Berserk £10, Tennis £10. Space Invaders £10, Ski-ing £10 Combat £10 Outlaw £10, Atari VCS no joysticks or paddles £15 swap everything for 16K Spectrum, Tel: Skipton [number deleted]

ATARI VCS inc 10 cartridges e.g. Pacman Indy 500 etc... have knocked off £20 because of no console box. Sell for £129 onto Tel: 044822523 from 5pm-10pm.

ATARI VCS plus £200 s/w (top games) also Super Charger + 2 games all v.g.c. with 2 joysticks, paddles and power adapter, offers? Tel: Dorking 837619 Guy.

Tandys for sale

TANDY C/C 32K with dual discs and printer £800 inc. Word processor + D Basic. Tel: 0525 714488.

TANDY GCP-115 colour graphics printer/plotter + dragon computer lead. Cost £168. Sell for £105. Tel: 01 360 3443.

TANDY PC2 + 8K Ram + printer + s/w manuals, leads, books, £200.00. Ring (0244) 677677 ex 64 (Bill).

VIDEO GENIE 16K Ram with integral cassette recorder. All manuals + leads included. Will sell for any reasonable offer. Also some software, eg Chess, James Ledingham 57 Lilyhill Terrace, Meadowbank, Edinburgh, EH8 7DR.

FOR SALE Tandy CGP 115 colour, graphics printer + Dragon lead. Cost £167. Sell for £105. Tel: 01 360 3443.

PRINTER-PLOTTER, Tandy CGP-115, four colours 40 or 80 CPL, serial or parallel interface to suit most computers, complete with spare paper. £85. Tel: 061 439 7929 (Stockport).

TANDY TRS 80 MC10 colour, 16K Ram pack + P4SS load box — unused — value £120 — sell £70 onto Postage paid Tel: 0482 865333.

PRINTER, TANDY CGP-115. 40-80 characters in 4 colours. Also does graphics, Boxed with manual as new £95 Tel: 0525 312417.

TANDY CGP-115 colour printer/plotter with Centronics lead (for BBC) worth £180 will accept £100 or onto condition as new.

TANDY TRS-80 model 1 level 2 business computer all leads included. Much software. Also includes high resolution hardware modification. Ideal for small business. £150 ono. Phone 021 779 6877.

TANDY GP115 colour graphics printer and BBC lead. Cost £160 sell for £110 Tel: (0533) 897268.

For sale

T199/4A computer with 2 wire remote control + 2 s/w cassette recorder cable + 2 cassettes for T1 Basic £99. Tel 01 278 0572 after 5pm.

VARIOUS COMPUTER magazines eg. Your Computer, Popular Computing, Crash, ½ price. Jet Set Willy + Kong (new) £40 ono. Other Spectrum s/w (originals) ½ price. 5-6 pm (0296) 6437.

MAGAZINES all weeklies, most monthlies hundreds of back issues. Tel: 0209 608404 after 6pm.

SHARP MZ 700 with printer plotter and cassette button, s/ware, spare parts and rolls for plotter. Only 2 months old and boxed £250 ono. Or may consider swap. Tel: 01 863 0198.

SHARP MZ80A, dust cover, expansion interface + printer interface module, disc drive interface module, twin double sided-double density disc drive. Disc Basic + s/w. £750 ono. Tel: 01985 1509.

MICRODRIVE £40 — Currah Speed Unit £20. Kempston joystick Interface £7. Or £60 the lot. Tel: 0442 66641 (Ian).

SHARP MZ 700/11 £250 only. Tel: 01-808 6068.

TRS 80 MODEL 100 portable British Modern. Like new. Offers over £350. Tel: 01-879 3238. Mr Clarke.

MAGAZINES + dated cassette interface. Tel: 051-733 0090. (after 4pm) Richard.

SINCLAIR QL Kridge 3 model. AH Super Basic £400. Tel: Kings Langley 66780.

TRIGGER COMMAND joystick and Spectrum DK Tronics light pen £7 each or swap for other Spectrum hardware. Tel: Nick 0203 346 848 after 6pm.

ZX PRINTER for sale. Very good condition. S/w titles to swap or sell. Tel: Andrew 08823 245.

KEMPSTON JOYSTICK + interface and s/w. Sell or swap. Tel: David 08823 254.

TI 99/4A, JOYSTICKS, Basic Tutor, connect four, £60 Oxford (0865) 69346 after 6pm.

LYNX 48K £160 or swap for other non ZX81 computer includes leads, software, mags. Lynx computing book, power pack etc. A bargain. Phone Alan on Coventry (0203) 466035 evenings.

FOR SALE - Seikosha GP80A Dot Matrix Printer in mint condition, with approx. 1000 sheets of Fanfold paper, 2-3 ribbons and friction feed £75. Contact Richard Alderton, Phone Sheffield 20571.

MZ80A SHARP computer, built in monitor and cassette, 48K. Basic and Forth language tapes, many games dust

cover. As new, £200 for quick sale delivery by arrangement phone Rotherham (0790) 540336.

SPECTRUM, CBM 64. BBC software for sale. Wide range including Stalag 164 £3.50. Stompers for Spec 48 £3.00. Arcadia £3.00. BBC Killer Gorilla £4.25 and many more. Call (0204) 699737 after 5pm.

FOR SALE SIX 5½" single sided floppy disks and one 5½" double sided disk £3 each or £21 for the lot. Phone Mark on 603 9467 after six.

U.K. 101 for sale cased good order Wemon monitor leads power pack listings tapes first sensible offer Tel: Doncaster (0302) 722945.

BARGAIN T1994A with leads + joysticks also Parsec — Connect Four Tomb Stone City — Zero Zap Modules Teach Yourself Basic — UFO Hunchback cassettes + four books £80 the lot Tel: Burton (0283) 48975.

T1994A FOR SALE. Including Parsec cartridge, Basic tutor cassette, joysticks, 3 books and complete with all necessary leads and manuals. Yet only £70. Tel: Barnes 01-741 7824.

LYNX 48K PLUS APPROX £100 software only £110 obo tel: 735 4861 x 69 (day) 656 2897 (eve & weekend).

HISOF PASCAL 4T compiler for 48k Spectrum with 75-page manual and Turtle graphics package. Sell for £10 (cost £25). Mr S. Littley, 42-12 John Coales Hall, Bishops Rise, Hatfield, Herts AL10 9BT.

FOR SALE. PROTEK joystick interface, Interface 2 with Cookie cartridge and Quickshot joystick + over £50 of s/w will sell for £50 obo. Phone High Wycombe 26472 between 4pm and 4.30pm. Ask for Paul.

SPECTRUM software. Mini processor filing system, disassembler, bank account handler, £2.50 each. Personalised software for small businesses. Prepared in about two weeks £28. Phone Brian on Bolton (0204) 389498. AS NEW ZX printer with three Rolls, to highest bid over £25. As new Kempston Joystick interface to highest bid over £8.50. Write to: R.A. Kidd, 20 Buckfast Close, Ipswich, Suffolk.

TRAFAVGAR speaking watch M306. Classical alarm, stopwatch, hourly chime, clear speech, English and American voice modes. Costs £65. Sell £30. Tel: Horncastle 71789 (Plush).

OVER FORTY computer magazines £5.00. Also T199/4A Teach Yourself Basic (cassette) also Beginners Basic manual and Texas program book. Texas items £10 the lot. Tel: 061 795 9824. North: Manchester area.

TECHNICS HI-FI. SU 8077 amplifier (70W/C/Rms) 8077 tuner, M45 cassette (d/drive, 2 motor). Dual 505 U table, £1000 new. Perfect. Wanted — dual disk drive or t/text adaptor, W.H.Y. (for BBC B) or sell £450 obo. Write: F. Newall, 6 Beech Range, Levenshulme, Manchester M19 2EU.

Wanted

WANTED. SPECTRUM, VIC 20 or 64. In any condition, e.g. smashed or zapped. But must be cheap. The Laurels, Swaffham Road, Welling, Dagenham, Norfolk, NR19 2LZ Tel: 036287 327.

SONY CC7 VIDEO swap for Spectrum compatible printer DMP or Daisy Wheel, with interface Tel: 0733 237381 (Peterborough) evenings.

SWAP ACORN Atom fully expanded internally with built in word processor and assembler + s/w and all accessories for any other computer. Sell £75 obo S. Woolley 43 Jetson Street Gorton Manchester

SWAP MY SPECTRUM 48K + cas-

sette + Joy Interface + £50 of software. Still Boxed Six months old. For CBM-64 + cassette, manuals, SOFTWARE IF ANY. 958-7390 ask for Jonathan.

WANTED EPSON FX80 or similar and interface, and microdrive for £267 s/w £100. Mags and light pen, consol etc. My total offer worth over £450 Great offer! Phone 0445 582900.

SWAP 20 GAMES/utility programs for AGF programmable joystick interface or 10 games for Kempston interface also wanted Sinclair printer paper swap for games (0703) 844956.

WANTED CBM 64, C2N, swap for Spectrum 48k q Cambridge interface + joystick + data recorder + £150 of software. Any condition considered Tel: Bld (0274) 635068 any time after 5pm. **SWAP TAMIYA** Toyota 4x4 off road jeep with rechargeable batteries and chargers, for channel transmitter, mags, all boxed in excellent condition worth £300. For 48k Spectrum in excellent condition plus s/w. Tel: (0325) 718387.

WANTED DISK Drive for Atari 400. Paul Hardman 01-777 2605.

T100/4A SWAP video Chess + best of 99er. For mini memory module Tel: 01-643 2310.

DRAGON 32 Q S/W (originals) dust cover boxed new. Swap for CBM 64 or Spectrum 48K. Tel: H. Patel, Coventry 75511 ext 2112 day Coventry 24917 evens.

WANTED 48K SPECTRUM. No tape recorder needed. Tel: Dunstable 630230 (Bobby).

WANTED WORKING/BROKEN Spectrum for experiments will pay reasonable price. Tel: 01-539 5402 after 6pm (London Area).

WANTED CBM 64 with cassette and disk drive. Tel: 025 761 3445 after 4pm.

SWAP CITRON CXGT1 2400, faxed and MOT, Reg 1978. Tinted windows — electric. G. condition. Delivered anywhere for computer — any model — any model + s/w. Tel: Workington 0900-65614. Keith.

WANTED T199/4A mini memory disk drive editor assembler. Ring 02357-68689. Neopost Hertford.

WANTED FOR ATARI 400. Basic cartridge + manuals. Also will swap ETPCS Cartridge for any Atari 400 Cartridge. Phone Castle Town 689.

WANTED ZX PRINTER + Interface. Reasonable Price considered. Or 289-7365 Rob.

WANTED MODEM for BBC B must have 300 board as well as Prestel. Tel: Bradford 832981 after 6pm W. Yorkshire.

WANTED 48K Spectrum — will pay up to £80.00. Tel: 0922 38091 after 4pm. **AARRGGHH!! URGENTLY wanted:** 48K Sinclair Spectrum (model 3 or later). Must include manuals and leads and must be VIGC (boxed). Price around £45 (No software). Phone Now: 0558 822509 (Mike).

SPECTRUM SOFTWARE Tasprint, stop secrets, buy or swap for my other utilities.

WANTED BBC Model B in good condition books and accessories welcomed write to Edward Sia Garnett House Leazes Terrace Newcastle NE1 4LA.

TIME FOR A CHANGE? Swap my VIC-20 and C2N recorder intro-Basic software Spectrum cover worth £130 for your Spectrum 48K and software Meadowsdale Ave Tong Fold Bolton Lancs.

WANTED PRINTER Seikosha GP100A for Spectrum. Full details to Mr. Peak Redditch 61729.

SWAP 80 COMPUTER magazines, 2 arcade games (Splat, & Meteor Storm) and a camping sack for a programmable joystick interface and an Atari joystick. 0582 599576.

SWAP BONTEMPI Junior organ plus Invader from Space with Adaptor for ZX printer with six rolls of paper. Phone Neath 57697.

TEXAS INSTRUMENTS 59/Printer PC 100C, printer utility package, used magnetic cards. Phone Jeff. 0558 822509.

TRS80 MODEL I level II Tel: 0276 25391 anytime.

WANTED WORKING Teletype or similar cheap printer for £50. Contact J. Chapman 8 Weir Road, Rochdale, Lincs. Tel: 0706 524228.

WANTED 16K ROM pack for ZX81 £5.00 Leeds (0532) 463018.

SWAP DRAGON 32 for 48K Spectrum 8 game free (originals). Tel: Gateshead 776091.

SWAP SPECTRUM s/w. All originals — John after 6pm. Tel: 01-476 8884.

SWAP SPECTRUM s/w Sabre Wolf. G.hh. Underworld. Tel: James 01 476 9447 after 12pm.

WANTED SPECTRUM s/w for Exchange. Also 48K Spectrum Pay £60 and CBM64 Pay £130. Tel: 05827 69152.

SPECTRUM 48K for sale or swap for Sharp MZ80K. Inc: CDs Fuller keyboard, DK Tronics Programmable Interface with joystick. Over 10 original games £20 onto. Tel: 01 561 2736. **DRAGON SOFTWARE** to swap titles including Scramble Chess Lunar. R. P. etc. Tel (0256) 50956 (Kevin) after 5pm not on Mondays.

SWAP DURST colour enlarger 605 + accessories worth £800 for any computer considered. Tel: 903 3178.

SWAP VIC-20 Pirate Cove adventure cartridge for "The Count" adventure cartridge. No copies, must be boxed, in mint condition. Phone: Luton (0582) 505840. And ask for Clive 5.00 — 8.00.

SWAP: SPECTRUM 48K + cassette recorder + many 48K + 16K games and magazines, for Commodore 64 + C2N cassette recorder. Can't sell, must swap. Telephone Steve on Coventry (0203) 418809. After 5pm please.

WANTED SOFTEK 'IS' compiler — swap for 3 originals — choice of 30 including alchemist, Zip Zap, Manic Miner, Luna Crabs, Starclash, Space Wars, Pssst!, Tranz Am + more also software to swap or sell. Phone Martin (06065) 3882 4-6pm (originals).

SWAP OR SELL lots of VIC 20 games. All are originals. For details ring 051 644 6028 after 6pm or weekends.

SWAP HARRIER C BX. FM C.B. rig with accessories and books for VIC-20 starter pack or W.H.Y. (rig has swivelling Rodger. Bleep fitted) also Xtal filter fitted. Please tel: 051 644 6028.

SWAP TI99/4A, perfect condition, as bought, plus cassette lead, software, and books, for VIC-20 or 16K Spectrum, preferably Tyneside area. Best offer secures. Phone Ian on (0632) 553158 after five.

WANTED: ZX SPECTRUM 16/48K. Anything considered. Will pay reasonable price or part exchange for BBC software. Latest titles. Including Overdrive, Battletank, Spitfire Command + others. Tel: Frome (0373) 61552. Jonathan.

DISK DRIVE for Atari 800. Tel: 01 954 5275.

Diary

Event	Dates	Venue	Admission	Organisers
Electron and BBC Micro User Show	Aug 31-Sept 1 10.00am-8.00pm Sept 2 10.00am-4.00pm	UMIST Manchester	£2.00 adults £1.00 children	Database Publications 061-456 6083
Games Day 84	Sept 1 10.30am-6.00pm Sept 2 10.00am-5.00pm	Royal Horticultural Society's New Hall, Greycoat St, London SW1	£1.25	Games Workshop 01-965 3713
Hampshire Computer Fair	Sept 6 11.00am-9.00pm Sept 7 10.00am-5.00pm	Guildhall, Southampton	Trade - free Public - £2.00	Testwood Exhibitions 0703 31557
Walthamsoft 84	Sept 8 10.00am-5.00pm	Main Exhibition Hall, Waltham Forest Technical College, Forest Rd, London E17	£1.00	Londex Exhibitions and Promotions 01-564 5039
ZX Microfair	Sept 8 10.00am-8.00pm	Alexandra Palace, London N22	£1.00 adults 50p children (in advance)	ZX Microfairs 01-801 9172
Personal Computer World Show	Sept 19-22 10.00am-7.00pm Sept 23 10.00am-5pm	Olympia 2, Hammersmith Rd, London W6	£3.50	Montbuild Ltd 01-486 1951

New Releases

Twentieth

Son of Blagger is a spin-off from *Blagger* which in turn was heavily inspired by *Manic Miner*. Matthew Smith could never have suggested what he was going to start.

However, *Son of Blagger* happens to be a particularly fine form of this style of game.

The idea is to left-right-and-jump your way around a secret headquarters, collecting gold-end keys. There's a lot to explore, things to climb, conveyors, slides and dissolving floors. Various lunatic things happen in the different rooms (twelve in all) and, as ever, it's a matter of figuring out when and where to jump.

Alligata have thoughtfully provided a layout showing the entire game area so you can see what you are missing as you get killed in the first screen for the twentieth time.

In fact, if this didn't draw quite so much from *Miner Jetset Willy* I'd really rate it very highly indeed.

Program Son of Blagger
Price £7.95
Micro Commodore 64
Supplier Alligata
 178 West Street
 Sheffield
 S1 4ET

Nursery crime

Adventure games are commonly the province of a certain kind of teenage or young adult — generally the same people who like science fiction and often as not ancient progressive rock bands like Genesis.

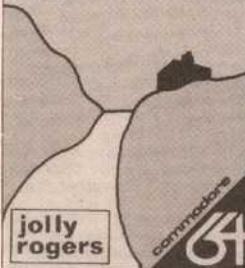
But *My First Adventure* is not for them.

Jolly Rodgers software has decided, rather sensibly that the younger kids could be persuaded to enjoy adventures too, hence the rather yukishly titled *My First Adventure*.

The only concession to this game being for young kids is the fact that the spelling is guaranteed correct and the problems are not quite so nightmarish as in some of the more brain-damaging traditional

adventures. That apart, it has the usual verb noun entry and I found it pretty difficult — for example, you keep meeting all these nursery rhyme characters but I never did find out what on earth you're supposed to do with them. However, I can tell you that 'Kill Little Boy Blue' doesn't work, neither does 'Get Little Miss Muffet'.

My First Adventure



There are graphics for many of the locations which are as good as anything you'll see in most other games and the whole game does, indeed, seem to be correctly spelt. For an adventure game, this must be a record.

Program My First Adventure
Price £5.95
Micro Commodore 64
Supplier Jolly Rogers
 19 Castleton Avenue
 Barnehurst
 Bexleyheath
 Kent DA7 6QT

Gaseous

Wye Valley software have come up with a sort of occult equivalent of *Jetpac* for the Commodore 64.

It's called Merlin and is pretty entertaining. You move the individual of the title around the screen, avoiding vast numbers of ghosts, ghouls, and other Hammer Horror type things. Merlin moves about either on a cloud or his broomstick needs a new exhaust since he appears to be sitting on something gaseous.

In *Jetpack* you had to collect bits of spacecraft and assemble them to make your escape, here you must collect the ingredients for the cauldron (to

nasty to go into any detail except to say they include a frog's leg) dropping them in one by one.

Every so often a parachute drops down and can neutralise the spells you've collected so far if you don't watch out and zap it quickly. Four screens is probably not enough and I'm surprised more weren't included — not memory restrictions surely? Still I found it fast and snappy and you probably will too.

Program	Merlin
Price	£6.90
Micro	Commodore 64
Supplier	Wye Valley Software Parton House Kinnersley Herefordshire.

Pick of the week

Edge-on 3D

You may have seen a rather impressive looking ad, for a couple of games for the Commodore 64 recently — the games are *Flip & Flop* and *Astro Chase* and the company is Statesoft.

Flip & Flop proved to be an absolutely wonderful *Q-Bert* where you bounce around a lattice of squares changing their colour as you go whilst being chased by a variety of strange animals.

In *Flip Flop* you are, alternately, a kangaroo and a monkey — the kangaroo bounces over a number of lattice platforms changing the colour of certain marked squares it can move from one level to the next only where there is a ladder. It's easy to take one bounce too many and go hurtling into space.

The monkey is on the 'underside' of the platform, swinging from one to the other, again watch out for that one swing too many. The ruin of many of us.

The 3D logic of what's where in 3D and which direction to press the joystick proved more than enough for me, but later levels have you chased by a zoo keeper and what looks like an iron grate.

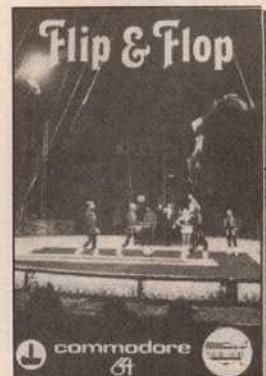
What really makes the game

Marsupial

Superior Software consider *Wallaby* to be one of the best programs they have ever released.

I think that Spectrum owners would probably greet it with a yawn but it ranks well alongside other BBC arcade games and has a certain amount of humour to redeem it as well.

Wallaby is a platform and ladders game, vaguely similar to *Donkey Kong* in that you have to climb to the top, in this case to rescue a stolen Wallaby, avoid various things being chucked at you by a group of monkeys and collect fruits for bonus points.



is only the constant frustration of leaping into infinite space that prevents me from naming this the best Commodore game of oh, well, yonks and yonks anyway.

Program	Flip & Flop
Price	£8.99
Micro	Commodore 64
Supplier	Statesoft

New Releases

You, I hasten to add, are a grown-up Wallaby (which looks, for all the world, like a Kangaroo so far as I can see). This means that you can bounce over some of the obstacles and, in true Tom and Jerry tradition, biff monkeys and obstacles alike with a swift uppercut from the paw.



It's good fun, even if there is a sense of déjà vu about it all. I did enjoy the wallaby's bounce complete with boiwing noise.

Program Wallaby
Price £7.95
Micro BBC
Supplier Superior Software
 Regent House
 Skinner Lane
 Leeds LS7 1AX

Pool perm

The pools prediction program Spectadraw has been around in some form or another for a good long while now, but the latest highly advanced, souped-up and permuted version complete with Currah speech compatibility and proper instruction manual has arrived.

Quite simply, the program uses a large database of information on the past scores of teams to predict what will happen in the future. It will predict the teams most likely and least likely to draw and, if you wish, generate ten 8 from 10 full cover lines which can be copied straight on to the pools coupon using a Spectasort perm generation program incorporated in the main program.

The manufacturer's say that using the program ups your

likelihood of winning by 20 to 30 per cent. What this means, in practice, is a fair likelihood of a series of small wins rather than much chance of a massive payout.

The program has been adapted for use with microdrive so that data can be easily saved — the reason for this being that you can develop the database as you go along adding more and more results and theoretically at least, making it more reliable.

Program	Spectadraw 3
Price	£9.95
Micro	Spectrum
Supplier	Spectadraw 1 Cowleaze Chinnor Oxford OX9 4TD

Bluff

I have waited for a long time for someone to bring out a version of poker for the computer. The mysterious Jungian collective consciousness has struck again and several versions have appeared all at once, for a variety of machines.

One, simply called *Poker*, is for the Spectrum. This one plays pretty much the standard game — dealing, few rounds of betting on what you've got followed by a change of cards to develop that hand and more betting.

You play against four other players all of whom are controlled by the computer. They raise the stakes of fold or bluff like real players although obviously with a computer involved the challenge is to make

them behave sensibly.

Over a couple of hands I found them pretty convincing. Two complaints — you appear to be limited in how much the computer will let you bet and if by some judicious and brave bluffing you get everyone else to fold there is no chance to see their cards (I know you're not supposed to but I should at least be an option) — ie, to determine whether you would have won on cards, or better still, that it was your sheer bravado that did it.

Nevertheless, perhaps because I like poker, I shall be playing this more than most of the other games released recently. The definitive computer poker that really induces the tension and anxiety of the real thing has yet to be produced though.

Program	Poker
Price	£5.99
Micro	Spectrum
Supplier	De Barron Software Bowie Hilllock Fyview Aberdeenshire

Shuffling

Atlantis are a new company marketing games for £1.99 — the 'pocket money' price initiated by Mastertronic. The first release I've seen from the company is *Eights* — a computer implementation of the popular card game.

The idea of the game is to get rid of all the cards in your hand — the two players must follow the 'lead' of the previous card and many only discard a card of the same suit or the same value. The eight is treated as a special card and can be used to change the suit to whatever you want, either to make it difficult for your opponent to go and/or easier for you to continue discarding cards. If you can't go you must pick up a new card.

In this computer version the computer plays very well and I hardly ever beat it on its simplest level of play, proving, since the cards are shuffled randomly for each new game, that it isn't a matter of luck. The game is thoughtfully designed, entering your card choice is very sensible and logical — J followed by C equals Jack of

EIGHTS

5 ♠	K ♦	5 ♣
7 ♦	Q ♦	
9 ♠	8 ♥	6 ♣
9 ♣	J ♥	3 ♣
10 ♠	2 ♦	
5 ♥	K ♠	A ♣

ATLANTIS

Clubs. Trouble has been taken, too, in the form of redesigned character sets - shuffling noise and so on. In short, this is wonderful value for money, and if you like playing card games on computers, a must.

Program	<i>Eights</i>
Price	£1.99
Micro	Spectrum
Supplier	Atlantis Software 19 Prebend Street London N1 8PF

Pie fight

There's no doubt about it, a lot of companies are dropping their prices. Comsoft, a BBC and Electron house, has its price at £4.95, around £2 to £3 cheaper than the BBC norm.

Custard Pie Fight is an absurdly simple idea.

The game simply consists of two figures facing one another trying to throw dodges pies — you play either against a friend or computer. That's all there is to it, but the simple pleasures of splattering someone in the face entertain for quite a while. Good for several laughs.

Program	<i>Custard Pie Fight</i>
Price	£4.95
Micro	BBC
Supplier	Comsoft 7 Roman Drive Leeds West Yorkshire LS8 2DR

Compiled by Graham Taylor

New Releases is designed to let people know what software is coming on the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.



Vic 20		Spectrum
1 (-) Snooker	(Visions)	1 (4) Jet Set Willy
2 (7) Sub Hunt	(Mastertronic)	2 (5) Jack and the Beanstalk
3 (-) Phantasm Attack	(Mastertronic)	3 (1) Tornado Low Level
4 (-) Undermine	(Mastertronic)	4 (3) Zaxxon
5 (-) Vegas Jackpot	(Mastertronic)	5 (-) Full Throttle
6 (10) 3D Maze	(Mastertronic)	6 (2) Blue Thunder
7 (8) Bewitched	(Mastertronic)	7 (-) Lords of Midnight
8 (-) Scrambler	(Mastertronic)	8 (7) Star Trader
9 (-) Choc-o-bloc	(Paramount)	9 (8) Chequered Flag
10 (-) Gridrunner	(Llamasoft)	10 (6) Match Point
(6) Wizard & the Princess	(Melbourne House)	(Fiction)

Two titles tied for 10th position
(Figures compiled by Books/Websters)

1 (-) Scooter	(Visions)	1 (4) Jet Set Willy	(Software Projects)
2 (7) Sub Hunt	(Mastertronic)	2 (5) Jack and the Beanstalk	(Thor)
3 (-) Phantasm Attack	(Mastertronic)	3 (1) Tornado Low Level	(Vortex)
4 (-) Undermine	(Mastertronic)	4 (3) Zaxxon	(Starzone)
5 (-) Vegas Jackpot	(Mastertronic)	5 (-) Full Throttle	(Micromega)
6 (10) 3D Maze	(Mastertronic)	6 (2) Blue Thunder	(Foundry Systems)
7 (8) Bewitched	(Mastertronic)	7 (-) Lords of Midnight	(Beyond)
8 (-) Scrambler	(Mastertronic)	8 (7) Star Trader	(Bug Byte)
9 (-) Choc-o-bloc	(Paramount)	9 (8) Chequered Flag	(Fiction)
10 (-) Gridrunner	(Llamasoft)	10 (6) Match Point	(Fiction)

(Figures compiled by W H Smith and Son, London)

Commodore 64	
1 (-) BMX Racers	(Mastertronic)
2 (-) Space Walk	(Mastertronic)
3 (2) Head Head	(Centresoft)
4 (-) Hawk	(Mastertronic)
5 (-) Hunchback	(Ocean)
(10) Manic Miner	(Software Projects)
(-) Blagger	(Aligata)
8 (1) Squirm	(Mastertronic)
9 (-) Superfont	(English Software)
10 (5) Flight Path 737	(Antrog)

Three titles tied for 8th position
(Figures compiled by Books/Websters)

ZX81	
1 (1) Krypton Ordeal	(Novus)
2 (3) Planet Raider	(Novus)
3 (4) Walk the Plank	(Novus)
4 (1) Alien Rain	(CRL)
5 (-) Football Manager	(Addictive Games)
6 (5) Black Crystal	(Carmel)
7 (2) Space Invaders	(PSS)
8 (8) Flight Simulation	(Fiction)
9 (-) Chess IX	(Fiction)
10 (-) Asteroids	(Quicksilver)

Two titles tied for 4th position and 7th position
(Figures compiled by Books/Websters)

BBC B	
1 (-) Overdrive	(Superior)
2 (2) Formula 1	(Superior)
3 (5) Micro Olympics	(Database)
4 (4) Aviator	(Acornsoft)
5 (3) Mr Wiz	(Superior)
6 (-) Ghouls	(Micro Power)
7 (-) Stock Car	(Micro Power)
8 (6) Star Striker	(Superior)
9 (-) JCB Digger	(Acornsoft)
10 (10) Snowball	(Level B)

(Figures compiled by W H Smith and Son, London)

Dragon	
1 (3) Pedro	(Imagine)
2 (1) Bunchback	(Ocean)
3 (-) Hungry Horace	(Melbourne Hse)
4 (-) Dragon's Lair	(Microprose)
5 (-) Cuthbert in Space	(Microdeal)
7 (10) Mr Dig	(Microdeal)
8 (-) Up Periscope	(Beyond)
9 (-) Ring of Darkness	(Wintersoft)
10 (2) Cuthbert in the Jungle	(Microdeal)

Two titles tied for 8th position
(Figures compiled by Books/Websters)

Atari	
1 (1) The Hulk	(Adventure International)
2 (2) Space Lee	(Datasoft)
3 (-) Space Encounter	(Novus)
4 (6) Zaxxon	(Datasoft)
5 (-) Flak	(Synapse)
6 (5) Captain Sticky's Gold	(English)
7 (-) Super Cobra	(Parker)
8 (10) Warlock	(Calisto)
9 (-) Saga 6	(Adventure International)
10 (-) Slinky	(US Gold)
9 (-) Saga 6	(Adventure International)
9 (-) 32K Cassette	Cartridge + 48K disc
10 (-) Slinky	(Birmingham 021 633 9458)

(Figures compiled by Calisto Computers Birmingham 021 633 9458)

Books	
1 (8) Commodore 64 Programmers' Reference Guide	(Pitman)
2 (-) Creepy Computer Games	(Usborne)
3 (-) Beginners Micro Guide, Spectrum	(Granada)
4 (5) 80 Progs for Commodore 64	(Pan)
5 (-) Commodore 64 Graphics & Sound	(Granada)
6 (-) Teach yourself Computer Programming, Commodore	(Hodder)
7 (-) Adventure Games for Commodore	(Granada)
8 (-) Easy Programs for Commodore 64	(Shiva)
9 (1) Beginners Micro Guide BBC	(Granada)
10 (-) Battle Games	(Usborne)

(Figures compiled by Websters)

Easy stuff

Easy Programming for the Atari Micros concerns itself with the generally boring area of 'How To Do Basic', but has a couple of important features.

Firstly, it's one of relatively few such books for the Atari machines that aren't expensive American imports. And secondly it is particularly well constructed.

It covers all the usual areas — the Basic commands, using sound, flow-charts, bug finding, different screen modes, etc, but takes more time to explain itself and lets you test that you really do understand what's been said to a greater degree than most other such books I've seen.

Book *Easy Programming for the Atari Micros*
Price £6.98
Micro Atari
Supplier Shiva
The Hawthorns
64 Welsh Row
Nantwich
Cheshire
CW5 5ES

Conceptual

Games Programming sounds like another one of those awful books of listings I've moaned about before, but mercifully it isn't.

What we have here is a serious book about writing

games. It looks and reads like an academic tome. *Games Programming* discusses the concepts behind games design rather than how to create *Space Invaders*. For example, it deals with things like the kinds of maths useful in wargaming.

The book varies between strictly programming information and more abstract considerations on how the real world can be modelled by a computer. It's rather earnest difficult stuff, but fascinating as well.

Book *Games Programming*
Price £7.50
Micro General
Supplier Cambridge University Press
The Edinburgh Building
Shaftesbury Road
Cambridge
CB2 2RU

Ozone layer

Tim Hartnell, author of many good computer books and editor of many others has recently issued a book called *30 Dynamic Games for the Aquarius*. I blame aerosols eating away the ozone layer myself.

Book *30 Dynamic Games for the Aquarius*
Price £2.95
Micro Aquarius
Supplier Interface Publications
9-11 Kensington High St
London W8 5NP

This Week

Program	Type	Micro	Price	Supplier	Payroll	UT	MSX	£29.95	Micro Aid
Crawler	Arc	BBC	7.75	Watford	Prisoner of Village	Ad	Spectrum	£5.50	Spool
Drillilla Killia	Arc	BBC	£6.90	Vampyre	The Lost Orb	Ad	Spectrum	£6.00	K W Computing
Dune Rider	Arc	BBC	£7.95	Micro Power	Paranoid Pete	Arc	Spectrum	£5.50	Ubik
Paranoid Pete	Arc	BBC	£5.50	Ubik	Diseases of the Heart	Ed	Spectrum	£6.95	Medidata
Pengo	Arc	BBC	£7.75	Watford	Master Mariner	S	Spectrum	£1.99	Atlantis
Bonsai Pools	Predict	UT	BBC	£7.00	Vagan Attak	S	Spectrum	£1.99	Atlantis
Connect 4	S	Commodore 64	£1.99	Bonsoft	Coursewinner	Ut	Spectrum	£12.50	Selec
Scrabble	S	Commodore 64	£12.95	Leisure Genius	Poolswinner	Ut	Spectrum	£15.00	Selec
Citadel of Chaos	Ad	Commodore 64	£5.50	Penguin	Space Art	Ut	Spectrum	£2.95	Eclipse
Forest of Doom	Ad	Commodore 64	£5.50	Penguin	The Untrust Program	UT	Spectrum	£12.00	Michael Flatford
Daley Thompson's Decathlon	S	Commodore 64	£7.90	Ocean	Sloopy's Christmas	Arc	T199/4A	£5.00	Gamesware
Strip Poker	S	Commodore 64	£9.95	US Gold					
Turbo Saver	UT	Commodore 64	£7.00	Arrow					
Death Valley	Ad	Dragon	£6.50	Micro Data					
Magic Midnight	Ad	Dragon	£7.50	Magic Midnight					
Return of the Ring	Ad	Dragon	£9.95	Wintersoft					
Zak'ssson	Arc	Dragon	£6.95	Cable					
Rat Race	S	Dragon	£7.50	Magic Midnight					
Ghouls	Arc	Electron	£7.95	Micro Power					
Felix in the Factory	Arc	Memotech	£6.95	Micro Power					
Cashbook	Ut	MSX	£14.95	Micro Aid					
Memo Calc	Ut	MSX	£14.95	Micro Aid					

Key: Ad — adventure/Arc — arcade/Ed — education/
S — strategy-simulation/UT — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.



Flatland

It's only logical when you think about it. We are three-dimensional people, but our computer screens present two-dimensional pictures of a 2D world. So perhaps it's a nifty idea to study the way a 2D world would really work.

Oddly enough, there's quite a stack of literature on the subject, stretching back to the pre-computer age, as long ago as 1884.

That year saw the publication of Edwin Abbott's *Flatland: A Romance of Many Dimensions*, which started the idea of thinking flat. Abbot's *Flatland*, is literally flat: the inhabitants (whose internal structure is wisely not described) are 2D geometrical shapes lying on, or rather in, an infinite flat plane. Because there's no third dimension of "height" a mere line in this plane is an impenetrable barrier to your average Flatlander.

This sounds familiar. *Flatland*'s geometry is more or less that of our old favourite *Pac-Man* — the chief difference being those "tunnels" at each side of the *Pac-Man* screen, where the flat space of the game sneaks round to join onto itself. A more thorough-going example is the curved space of *Asteroids*, which in cosmologists' jargon is "finite but unbounded" since whenever you reach the "edge" you reappear on the other side.

Two authors wrote sort-of-sequels to *Flatland*, introducing the curved-space idea in different ways. Dionys Burger's *Sphere-land* (1965) converts *Flatland* into the surface (only) of a sphere, so you can travel forever on the "plane" without reaching an edge. The idea of the book is to push

Einstein's view of our universe as curving through 4D space, so that to travel far enough out from Earth will take you clear round the curve of the universe and back.

The other view of 2D life comes from Charles Hinton's *An Episode of Flatland* (1907). Instead of making *Flatland* a 'map' viewed from above, as in *Pac-Man*, Hinton saw it from the side with a definite 'up' and 'down' (but, to compensate, no north or south). Just as in *Space Invaders*, Hinton's Flatlanders stand upright on the rim of the circle, their planet, towards whose centre they're pulled by gravity. 2D gravity, of course, obeys an inverse-linear instead of an inverse-square law. The flat, circular planet orbits a flat, circular sun in a flat universe...

The latest work on the subject is *The Planiverse* by A.K.Dewdney, a 1984 paperback (Picador £2.95) which tackles a 2D world in mind-boggling depth.

In 2D, a piece of string is a versatile tool. It can't be knotted without an extra dimension, but the Flatlanders (Dewdney even gives them a plausible biolog!) can walk over deep gorges on it, in effortless tightrope-fashion; can hold it stretched overhead as a perfect umbrella; can carry water in a loop of it; or can loop the string around an area of light gas to create an instant, personal airship. There's no way to fall off a tightrope since there is no "sideways".

The book goes further. Conventional wheels don't work (the axle has to be central, and therefore inaccessible because it's totally enclosed by the wheel's rim), but rollers do. You can't nail two planks together: when the nail goes through the top one it splits it completely in two. Rainfall causes flash floods because the soil's impervious. And so on...

Very soon I expect to see a computer game simulating the weird possibilities and restrictions of a *Flatland*. Go North, you forgetfully type, and the computer replies: *North is an abstract metaphysical concept without real meaning in this universe, square.*

It could leave you feeling pretty flat.

David Langford

Pyramid building

Puzzle No 121

When Wolfgang the woodcutter had a very large cube of wood surplus to requirements, he cut it into a number of identical smaller toy blocks for his young offspring. He was surprised to find, when at last he finished, that he had made exactly the right number of blocks for his child to build a square-based pyramid. He boasted of this fact proudly to the village schoolteacher that night.

"You say that your son built a square pyramid," queried the teacher, " — the type with a single block on the top tier, a two-by-two arrangement on the second from top tier, and so on?"

"That is correct," said Wolfgang.

"And each of the blocks is exactly cubic, as was the original piece of wood?" Wolfgang nodded.

"It's impossible!" replied the schoolteacher.

They rushed off to the woodcutter's house to investigate the matter, and the solution was quickly found. In building the huge pyramid, just one of the small blocks had rolled into a corner where it had lain undetected.

How many blocks were there in all?

Solution

The program places consecutive integers into a string and scans them for their individual digits. Each element of the dimensioned array *D(10)* is incremented by one to keep a tally of the total number of times each digit occurs (the zero's go into *D(10)*).

When *D(1)* is equal to *D(2) + D(3)* the results are printed:

```
10 DIM D(10) 20 LET N = 1 30 LET NS = STR$(N)
40 FOR M = 2 TO LEN (NS) 50 LET T = VAL
(MIDS$(M$,(M,1)) 60 IF T = 0 THEN LET T = 10 70
LET D(T) + 1 80 NEXT M 90 IF D(1) = D(2) + D(3)
THEN PRINT N 100 LET N = N + 1 110 GOTO 30
```

Note that the string *NS* is scanned beginning at position 2 in Lines 40-80 as many micros reserve the first character for the positive or negative sign. This results in a number of possibilities, but the only odd one is when *N* = 115. (The next highest odd result (*N* = 1499) would also be too large for a 'slim' volume.)

Winner of Puzzle No 116

The winner is: Roland Langridge, Regent Street, Clifton, Bristol, who receives £10.

Rules

If the puzzle can be sensibly solved using a computer then the winner will have included a listing of the program used to find the correct answer. The closing date for entries to Puzzle No 121 is September 8.

The Hackers



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